



FRIDAY, AUGUST 12, 1898.

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The other is that State Superintendent of Public Works Hannan permitted an opening to be built in the bottom of the canal. Technically this is incorrect. He allowed a timber covered culvert to be built under the bottom of the canal, but the opening was not made until this spring. The correction, however, is immaterial, as it is doubtful if any man would have allowed a culvert so constructed unless he expected to have it opened.

The average annual net income derived from about half the water power at Lockport is over \$20,000, and as the aggregated financial interests there are great enough to threaten serious temptation to State Superintendents of Public Works and their subordinates to neglect the public interests for political or pecuniary considerations, the prominence you have given this branch of the investigation, just closed, constitutes a public service which I hope may result in remedial legislation.

EDWARD P. NORTH.

To the Editor of the Railroad Gazette:

As I read your summary of the evidence in the investigation of the New York State Canals matter a great question suggested itself: Shall the state improve such streams within the state as are capable of yielding considerable amounts of power at convenient localities, by constructing storage reservoirs, and charge to power consumers on these improved streams a proper rental? How would such a development of the natural advantages of the state, which would seem to yield whatever of return there might be, directly to the people of the state, and which would operate for good in almost every county of the state, compare with the construction of a ship canal or further enlargement of the present canals?

ENGINEER.

Engine Rating in Victoria.

Victorian Railways, Melbourne, June 27, 1898.

To the Editor of the Railroad Gazette:

Having seen from various reports that the subject of making up, or computing the loads for engines by tonnage, instead of by vehicles, is an interesting one in America, I have taken the liberty of forwarding you a copy of the Appendix to the working regulations of the Victorian Railways, Australia, which sets forth the method for making up trains for some time in force here with very satisfactory results. I have inclosed two waybills used by the guards, on which they show the tonnage loads of trains, and have also sent copies of the Working Timetable and Book of Regulations. They differ considerably from similar publications issued by American railway companies that have forwarded their working orders for perusal at the request of our Commissioner for Railways.

The light weight of our medium, or low-sided, 4-wheel wagons, fitted with Westinghouse brakes, averages about 6 tons, and of our high-sided, covered wagons about 7 tons. In our method of computation, when empty wagons are dispatched 6 tons only is allowed for low-sided wagons and covered, high-sided wagons are computed 8 tons, viz., an extra ton is allowed the latter for the effect of wind.

I may also mention that all our engines are fitted with Westinghouse brakes, also all our passenger stock, and over 50 per cent. of our goods stock; the remaining portion is nearly all fitted with pipes so that practically all trains are controlled by the driver. Several of our shorter grades are worked by momentum, for instance, one grade of 1 ft. in 40, total rise 88 ft., is worked as a 1 in 50 grade (2 per cent.), and one grade of 1 in 70, total rise 52 ft., is worked as a grade of 1 in 88 ft., and so on. Useful statistics can be compiled from the tonnages shown on the guard's sheets as to loads of trains, loads of trucks, east and west, or as it is designated here, up and down.

[The train waybills received show that an engine which was rated to haul 270 tons over a certain section having a 2 per cent. grade, hauled in one instance 269 tons, the train being made up of 29 cars and a caboose. On another division, where the engine was rated to haul 375 tons, the total weight of the train was 374 tons 1 cwt., there being 24 cars and a caboose. As these are examples from ordinary working, evidently considerable care is taken in making up the trains.—Editor Railroad Gazette.]

The Future Development of the Locomotive.*

By Maurice Demoulin, Engineer.

The locomotive is at present in most countries undergoing an interesting evolution, tending to make it a more suitable instrument for hauling increasingly heavy loads at higher and higher speeds; in other words, to increase its actual power, its power per unit of weight and its stability. The limitations due to the strength of the road and bridges or to the gage and clearance, to the minimum permissible radius of curves, to the length of turntables and to other special circum-

*From the Bulletin of the International Railway Congress.

stances combine to render the problem more difficult every day. But up till now the locomotive has fulfilled all requirements and has developed in proportion to the traffic. And if we were tempted to believe that it had almost attained the extreme limit and that its further development was stopped by the restricting circumstances with which it is surrounded, we need only cast a glance at what is happening on the other side of the Atlantic, and we shall be convinced that the limitations are of a very elastic nature, and that they can be considerably stretched. We find, moreover, especially in France, Belgium and Austria, tendencies similar to those which have lately led to such remarkable changes in American engines. It is therefore not without interest to see, in a general way, what these tendencies now are and to what types of locomotives they may lead, types which will besides vary less and less according as, in the future development of the locomotive, the dimensions of its principal parts reach determined limits. In short, the variety of types ought to decrease as the difficulties met with in the arrangement of their parts increase. For instance, when in 4-coupled engines the dimensions of the firebox grow to a given extent, there remains only one or at most two methods of arranging the fire-box relatively to the wheels; similarly when the diameter of the cylinders exceeds a certain limit, they cannot be placed inside the frame plates, and consequently the inside cylinder arrangement, at present much in use, must disappear.

It is necessary to differentiate between increases of absolute power and increases per unit of weight. If the absolute power only of a locomotive be increased, its weight becoming proportionately greater, heavier loads could, it is true, be hauled at given speed, but the maximum speed possible would not be greater, for this could only be attained by increasing the power per unit of weight.

I mean here by power the work which a locomotive can do, and not merely, as is sometimes meant in railway parlance, the capacity an engine possesses of hauling a load; in other words, I am considering the power developed either on the pistons, or at the rim of the wheels, or at the draw bar, and not exclusively the amount of tractive effort, more or less apart from all idea of speed.

The increased power per unit of weight may be attained by the reduction of dead weight without the total power of the motor being altered.

An increase of the absolute power and in the power per unit of weight at the same time, may be attained by greater economy (in consequence of a better utilization of the heat produced) and by increased steam production in the boiler.

An increase of the absolute power alone can be effected by increased capacity of the boiler and cylinders.

Improvements in the quality of metal used can only be regarded as a means capable of increasing, quite indirectly, one of the two above-mentioned powers and then only in consequence of the greater economy thus obtained. Engines can in this way be made more flexible and be made capable of containing in their boilers a greater quantity of potential energy.

We will now discuss, as briefly as possible, how and to what extent engines can under present conditions be made more powerful and less heavy.

Increase in an engine's absolute power depends upon the boiler. It is easy enough to increase the cylinders as much as one likes and construct the other moving parts in proportion, but to increase the power of boilers is far from being so easily managed, although we are, at least in Europe, far from having attained the extreme possibilities which, owing to the increasingly general tendency to raise boilers, have been extended far beyond the limits that it formerly seemed reasonable to expect.

When the fire-box comes down between the frame plates its outside measurement must be a little less than the distance between the frame plates, or about 4 ft. 1/8 in. (1m23), and this must be further reduced by some 1/4 or 1% in. (30 or 40 millimetres) if the fire-box is to be situated between the horn plates of one of the axles. If the frame plates are outside the wheels, a practice once very common in Europe and still usual on the Belgian state railroads, the width of the fire-box is no longer limited, but by the internal measurement between the tires and its external measurement may be easily made about 4 ft. 1/4 in. (1m25). Besides, the axle boxes and their slides which are outside no longer interfere, and this permits of the fire-box ring being put nearer the axle beneath it and, as the height of barrel remains the same the fire-box can be made deeper.

But, as the fire grate cannot be made indefinitely longer—the maximum length being limited, through its being necessary to allow of free enough action of the fire, to about 9 ft. 2 1/4 in. (2m80), though as much as 10 ft. 2 in. (3m10) has been tried—it is impossible, when the fire-box reaches between the frame plates or only between the wheels, to make the grate area appreciably more than 32 square feet (3 square metres). A grate surface such as this is obviously sufficient with ordinary fuel to develop enough power to haul the heaviest and fastest trains at present run, but it would not be enough to do the work if less good or very small coal, or coal such as anthracite were used. It will not suffice as soon, and the day may soon come, as it becomes necessary to run heavier and faster trains and to go up gradients at higher speeds. The necessary power will be deficient, inasmuch as the rapidity of combustion cannot be proportionately as great on large grate surfaces as on small ones. Three times as much fuel will not be consumed on a grate with an area of 32 square feet (3 square metres) as on a grate with an area of 11 square feet (1 square metre). The way in which the fire is kept up and the method in which locomo-

Contributions.

Rail Buckling Under Heat.

July 22, 1898.

To the Editor of the Railroad Gazette:

We have had several cases of what is known as rail buckling, but in each case it was due to thin ballast, or where the track was raised and not filled in. We have had no trouble where there is full ballast.

GEN. MANAGER.

Pittsburgh, Aug. 5, 1898.

To the Editor of The Railroad Gazette:

I have read with considerable interest the correspondence and other items that have recently appeared in your columns concerning the bending of rails under heat. Recent conditions have given to this phenomenon a new aspect, and it is a matter which requires attention, for with the high speed and heavy rolling stock now used it is necessary to reduce the expansion allowance between rails to a minimum in order to get the smooth track essential to modern train operation. This point was well brought out by your correspondent "P. A. E." in your issue of July 15, but it seems to be impossible to get a splice which will allow for the proper expansion of rails, and at the same time give the same statistical moment as the rail section. If the bolts are drawn up as tight as they must be to give the necessary support we have to contend with bent rails in the summer and broken rails in the winter.

The Fort Wayne instance described in your issue of July 22 does not belong in the same class, although when the track was uncovered and exposed the twisting was bound to take place as it did. Of course, we understand that street car rails can be laid with closed joints, and even with welded joints, because only the top surface is exposed to the direct heat of the sun, while the greater part of the rail is considerably protected from the changes of temperature of the air. When the ballast is removed and the rail is laid bare on a hot day it is pretty sure to bend, as happened at Fort Wayne.

But there is another condition applying to street railroads which is probably even more important than this matter of protection against the direct rays of the sun, as you have frequently pointed out in your columns, namely, the fact that the movement of a rail longitudinally is resisted by the friction between the rail and the pavement, and consequently the stress induced by change of temperature is accounted for by the elasticity of the rail itself.

E. G.

The New York State Canal Investigation.

New York, Aug. 4, 1898.

To the Editor of the Railroad Gazette:

Your redaction of the testimony taken by the Canal Investigation Commissioners (July 29, p. 542) is so very good that I think you will be pleased to have two corrections made—one as to the statement that the Division Engineer was thoroughly familiar with the fact that rock existed where no rock was returned on one contract. This is not warranted by the testimony, which seemed to show nothing worse on the part of the Division Engineer than carelessness in the computing room. The Principal Assistant Engineer, however, was apparently conversant with the fact, having been brought up in a canal village at that point.

tive fire-boxes are arranged, the quality of the fuel remaining constant, tend to reduce the quantity of coal that can be burned per unit of time and per unit of grate area if this be increased. As soon as the grate area exceeds a certain figure we must expect to find reduction in the power it is capable of developing per square foot. This is all the more so in that fire-boxes with considerable grate area are as a rule less deep than others, because they must be above one axle or even above the trailing wheels, and it is a recognized fact that rapid combustion can only be successfully obtained in deep fire-boxes fitted with a brick arch and in which there is a strong draught.

The only way in which the grate area can be made greater than about 30 square feet, or at most 32 square feet, is to enlarge the grate itself beyond the limits dependent upon the distance between the frame plates or tires, and to do this we must fix the fire-box ring high enough to enable it to lie either above the frame plates or above the wheels. If the fire-box is situated completely above the frame plates it can, consistently with the continued use of inside frames, be made as wide as in the case of outside frames. There is thus but little gained, and to make the alteration of much avail the grate must be put above the trailing wheels, which makes it possible to have the fire-box as wide in outside measurements as the available clearance allows. This is nothing new, for it was tried before by Mr. Petiet in France and shortly after in Belgium by Mr. Belpaire, who has made it a current practice during the last fifteen years. In the United States Mr. Wootten has gone a step further, which has enabled him to use a grate area of 86 square feet (8 square metres) in some very powerful engines burning anthracite coal.

In Belgium they have confined themselves to applying the enlarged fire-box to engines with coupled wheels 5 ft. 7 in. (1m70) in diameter, or to express engines in which the fire-box only extended above a carrying axle mounted on wheels of small diameter, the fire-box not being enlarged in the part lying between the coupled wheels. This, however, necessitated having the center line of the barrel about 7 ft. 10 1/2 in. (2m40) : 8 ft. 1/2 in. (2m45), which was at one time excepted in Europe. In America they have gone still further; this arrangement is now used in 4 or 6-coupled express engines, with a wheel diameter of from 6 ft. 2 1/2 in. to 6 ft. 6 1/2 in. (1m90 to 2 metres). The fire-box ring is thus as much as 6 ft. 10 1/2 in. (2m10) above rail level and the center line of the boiler 8 ft. 10 1/2 in. (2m70). Despite all this the fire-box is exceedingly shallow and is hardly suitable for burning poor coal; and yet we must not lose sight of the principle that the locomotive, which ought to be kept as light as possible, ought also, if speed is to be increased, to be less heavy per unit of power, and it is essential to maintain rapid combustion in the fire-box unless the increased grate surface is intended to allow of poorer fuel being used, which is not what we are here considering. To accomplish this it is absolutely necessary to have the fire-box deep enough, and this cannot be done under the above circumstances without raising the boiler and center of gravity to an impossible extent, not to mention that the height of bridges would not always permit of such a large boiler.

It appears, therefore, as if in future engines, designed to have very large grate areas and intended, we repeat the point, to have increased power, but not to allow of inferior fuel being used, we shall have to resort to arranging the axles after the fashion adopted by the Belgian state railroads for their engines of class 12, and which for more than twenty years has been customary with the Orleans Company. But it will also be necessary to make some alterations with a view to making the stability proportionate to future increases of speed. The two coupled axles will be carried under the barrel, the trailing wheels being in front of the fire-box, which it will be possible to make as large as the loading gage allows of. A pair of carrying wheels whose diameter does not exceed 4 ft. 3 1/4 in. (1m30), will be situated under the grate and the front of the engine will be carried on a bogie, which will be all the more necessary because the cylinders, owing to their large diameter, will have to be outside. We thus arrive at an arrangement which seems to meet all requirements.*

The two coupled axles are very close together, but this will only tend to favor high speeds, because the coupling rods are less strained by centrifugal action. The absence of wheels of large diameter will permit of our making the fire-box as extensive as the clearance permits of. The leading bogie ensures stability and allows of the weight being distributed properly. In this way express locomotives can be constructed with a grate area of as much as 65 or 75 square feet (6 or 7 square metres) and a heating surface of about 23.8 square feet [Probably M. Dunoulin wrote 2,380 sq. ft.—Editor] while the barrel, owing to the height at which it is situated, can be of as large a diameter as required without our having to consider what is the distance between the tires of the coupled wheels, whether their diameter be 7 ft. 2 1/2 in. (2m20) or more. An engine such as this would weigh from 65 to 68 tons in working order and would, we believe, be capable of hauling express trains weighing 400 tons at an average speed of 46.6 or 49.7 miles (75 or 80 kilometres) an hour on main lines with average gradients.

Locomotives of this pattern, which would seem to constitute the latest and most powerful type of 4-coupled engine, are already beginning to be taken up in the United States (Philadelphia and Reading; Chicago, Milwaukee and St. Paul) and they will find increased favor in Europe in proportion as the weight of express trains increases while the speeds are far from being reduced.

When the diameter of the driving wheels is kept below about 5 ft. 8 1/2 in. (1m75) the fire-box must still be of a fair depth, and as the axis of the barrel can, without inconvenience, be as much as 9 ft. 2 1/4 in. (2m80) above the rail, the enlarged fire-box can be situated above the coupled wheels and no special arrangements are necessary either in the case of 6 or 8-coupled engines unless it be the use of a leading bogie or Bissel truck, which is needed to carry the additional weight due to the increased power of the boiler, so as not to make the load per axle too high. We thus come back to the recognized types.

The engines with enlarged fire-boxes of these different patterns seem to be the extreme that can be managed without going outside the accepted arrangements. We trust soon to be able to show by what means we may hope to extend the limits, wide as

they still are, within which this class of engine is confined, and to show the possibility of building engines capable of developing as much as 2,500 indicated horse power.

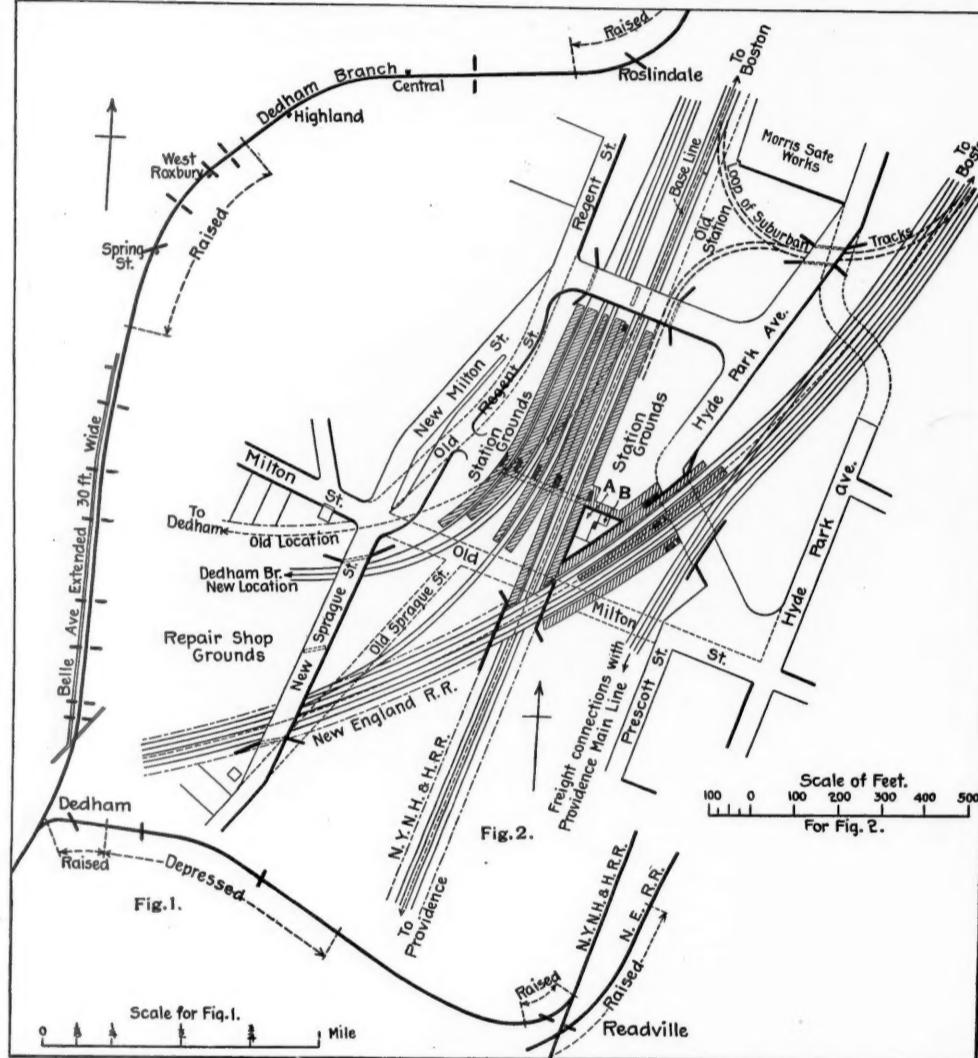
Engineering Gazette of May 1898
Readville, Dedham and West Roxbury Improvements.

The improvements here described may be considered a sequel to those between the Park square station and Forest Hills, Boston, and begin where the latter left off. They cover a length of road of about seven miles, situated in the towns of Boston, Hyde Park and Dedham. These portions constitute the loop formed by the West Roxbury and Dedham branches and the main line of the Boston & Providence division, and also the portion of the New England Railroad in the immediate vicinity of Readville. These railroad lines are shown in the upper, lower and left hand margins of the drawing numbered 1 and 2. (This line in the border will be referred to as Fig. 1, and the larger scale drawing in the body of the cut as Fig. 2.)

The improvements consist in the abolition of all grade crossings, together with such additional changes in the railroad, highways, adjoining streets and station facilities as to place them in first class condition. The work has been, like that at Forest

the main line of the Providence division; and, secondly, as the crossing of the latter by the New England Railroad. The coalition of management of the two roads has made it possible to work them together to better advantage, and the tracks will be connected at Readville. All freight heretofore passing to Boston over the Providence line will be transferred here to the New England road, and the New England will transfer most of its express passenger traffic to the Providence road. Another feature is a loop track at this point for the suburban trains, which will probably be propelled by electric motors.

The extent of the changes at Readville is shown by the plan, Fig. 2. There were originally two grade crossings, both on Milton street (see Fig. 1), where it crossed the New England road and the Dedham branch of the Providence road, passing over (above) the main line of the latter between the two grade crossings. The New England crossed the Providence main line also by a bridge at the same point. There were thus three grades to be provided for, and the impracticability of putting the street under both railroads (on account of the watery soil) made a satisfactory solution of the problem difficult or impossible. That which has been adopted is as follows: The old Milton street crossing has been abolished entirely, and another substituted 700 ft. further



Figs. 1 and 2.—Readville, Dedham, and West Roxbury Improvements, New York, New Haven & Hartford Railroad.

Hills and Brockton, of the most solid character, and intended as far as possible to place the road in final condition, allowing for future development. Although, like the two others mentioned, it has followed the general provisions of the State grade crossing law of 1890, a special supplementary act, providing for this work, was passed in April, 1896. Under this law, which was passed in response to petitions of the railroad companies and the Selectmen of Dedham, the abolition of all the grade crossings in the district was provided for, also such changes in the stations as was made necessary in connection with the same. The railroad companies were directed to do the work; and of the cost, 55 per cent. was apportioned to the railroad company, 18 per cent. to the State, and 13 1/2 per cent. each to the towns of Hyde Park and Dedham. In the same act, the electrical equipment of the branches and main line of the railroad between Readville and Boston was also authorized. Actual work was not commenced until January last, but it has been pushed forward with great rapidity, so that it is already within two or three months of completion.

Readville, the site of the principal part of the work, is a small village about nine miles south of Boston, in the town of Hyde Park. It is of importance from a railroad standpoint in two ways: First, as the junction of the Dedham branch with

north, at a point just above the junction of the Dedham branch and main line, where the street crosses both on a long two span girder bridge. The New England main line passes over this highway by an immense stone arch, forming the new crossing of Hyde Park avenue; the latter rising sharply on the west of the arch by a 5 per cent. grade to the level of the New Milton street bridge, Hyde Park avenue continues northward over another small girder bridge across the suburban loop-tracks connecting the Providence with the New England road.

Perhaps the most important engineering feature of the work is the arch just mentioned. It is probably the largest in area in the country, having a span perpendicular to the axis, of 78 ft., and a length parallel to the axis of 165 ft. It is skewed differently on each end, the skew on the east end being 29 deg., and on the west 12 deg. It is to cover a street 60 ft. wide, and at the outside of the street line is 7 ft. above the sidewalk, the arch being continued to the level of the ground. The height of the crown above the street in the center is 15 ft., a rise of only 8 ft. for the portion of the arch above the street. But the skew makes the effective span of the east face 89 ft., giving an extremely flat appearance. The corners under the arch are left open, and an exterior curb is used, to prevent persons from passing too close to the corners of the arch.

Considerable difficulty was experienced in preparing a foundation for this arch. The ground is naturally watery, and immediately below the location a deep bed of fine wet sand was found, which necessitated a foundation of 28-ft. piles, with concrete overlaid. A complication in the design is introduced by two groins in the southern side of the arch, to accommodate stairways giving access to the station

The railroad grades throughout the loop in which the grade crossings have been abolished have been changed for a length of 30,700 ft., of which 24,500 ft. was elevation and 6,200 ft. depression. The maximum depression was a cutting 7 ft. deep, mostly through rock. The elevation was at four different points on the West Roxbury and Dedham branches, except a length of 5,000 ft. on the New England road

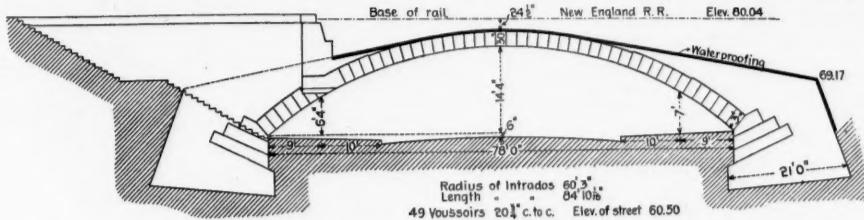


Fig. 3a.—Section Through Center of Hyde Park Avenue Arch, Readville, Mass., New York, New Haven & Hartford Railroad.

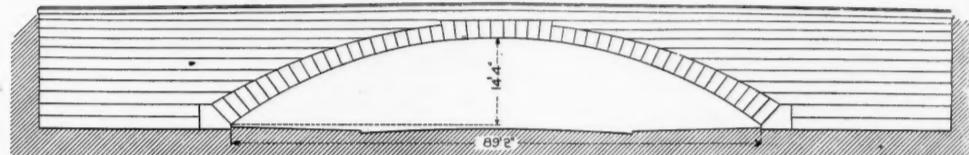


Fig. 3b.—Arch at Readville—East Face

platforms above. This arch has the usual concrete backing, and a waterproof covering of tarred paper and asphalt.

The grade of the railroads at and near the point of junction remains almost unchanged, and the radical changes in the street locations (as shown in Fig. 1), made necessary by having to cross both railroads where they cross each other, have necessitated correspondingly great changes in the grades of the streets. As previously explained, the Milton street crossing problem was solved by going under the upper and over the lower railroad; but with Sprague street this solution was impossible, as the space at this point between the two railroads is required for tracks, the purpose of the road being to build repair shops on the land west of Sprague street. It was necessary, therefore, to take the latter over both railroads, requiring a raise of 40 ft. in the grade. It crosses them on a truss bridge 446 ft. long, of two equal spans, and having a grade of 5 per cent. New Milton street, also, had to be raised 15 to 20 ft. above the former street level.

The small girder bridge which carries Hyde Park avenue over the suburban loop is noticeable for the allowance of only 15 ft. headway for the cars, about the same as in the loop of the South Terminal passenger station at Boston. Though this is sufficient for any standard locomotive or car in use, it is not expected that the tracks running under this bridge will be used for anything but electric cars, such as are now in use on the Nantasket branch of the New Haven road, and proposed to be installed on this suburban line.

The road bridge constituting the New Milton street crossing over the Providence road is 200 ft. long, in two spans, and is noticeable for a vertical bend in the western span, at 17 ft. from the central pier. It is composed of four plate girders, each 8½ ft. deep.

The old girder bridge at the crossing of the two railroads will be replaced by a new truss bridge of very much increased size. The old bridge is about 53 ft. long and 30 ft. wide, allowing for two tracks over and two under it. The new one will be 142 ft. long (measured parallel to the trusses), and 88 ft. wide, allowing for five tracks on the New England road; and consists of six through trusses on 18 ft. centers. Below there will be a width of 80 ft. perpendicular to the abutments, allowing for the four main tracks of the Providence road, and the extension of two station platforms under the bridge.

The two old stations of the New Haven and New England roads are to be replaced by a new union station of triangular form, located in the angle formed by their crossing. It will be a two-story brick station, the lower portion being for the New Haven and the upper for the New England road. There will be a separate platform for each pair of tracks, and there will be a subway from the station under the tracks connecting these platforms, similar to those at Brockton and elsewhere on the lines of this company. This subway is shown in section in Fig. 4.

To provide for the exchange of traffic between the two roads, the New England tracks will branch from the west side of the junction to the north, to join the Providence main line north of the station. These tracks are designed exclusively for express passenger trains. For the freight the connecting tracks will be on the east side of the junction, and will extend about a mile parallel to the Providence main line before joining it. There will be extensive sidings here for the storage of cars, and Readville will become a freight handling center of considerable importance.

to changes in location, and one new railroad bridge of the New England over the Boston & Providence road, making in all 15 new bridges besides the Hyde Park avenue arch.

In addition, the company has availed itself of the occasion to build five new stations besides that at Readville. They are frame buildings, and three are island stations, two of them approached from above and one from beneath by stairways, and access to the stations can be controlled at the stairways by fare gates or otherwise. As the suburban electric cars will not have steps, the platform of each station is divided transversely into two portions—one for the steam and the other for the electric service, the latter portion being raised to the level of the car floor, which general platform arrangement is to be observed wherever practicable in the suburban district.

A large amount of paving and general street work has been done. All the altered portions of the streets in Boston and Dedham towns are to be macadamized, with paved gutters and granite curb, except the Belle avenue extension mentioned above, which will have a gravel surface. A part of South street in Roslindale had to be removed to a new location several hundred feet south of the old one, in order to make a satisfactory under-crossing. In Hyde Park most of the new street work will have a gravel surface, but the station grounds will be laid with macadam. Readville is at present scarcely more than a village, but is in a beautiful location at the foot of the Blue Hills, and undoubtedly will grow rapidly as a result of the improvements. It will be one terminal of the suburban trains of three railroad routes, and its improved freight facilities will make it more desirable for manufacturing establishments. There are at present several large factories here.

These improvements have been carried out under the direction of Mr. George R. Hardy, C. E., Assistant Engineer of Construction, and under the general supervision of Mr. F. S. Curtis, Chief Engineer of the road. The contract for all the grading and masonry in Hyde Park and Readville was awarded to J. J. O'Brien, and on the branches to Dwight & Daly. The bridge superstructures at Hyde Park and Readville and on the Dedham branch are being furnished and erected by the Pennsylvania Steel Company, and those on the West Roxbury branch by the Berlin Iron Bridge Company. The Readville station is being built by Horton & Hemenway; the contracts for the others are not yet all awarded.

Opening of the Waterloo & City Railroad.

On July 11 last the new underground electric railroad between Waterloo station and the Mansion House (London), was opened by the Duke of Cambridge with appropriate ceremonies. The map of the route of this road, given in our issue of Sept. 3, 1897, shows the object of the line—to afford the London & South Western access from their terminal at Waterloo to the heart of the city. The necessity for this connection has been recognized for some 50 years, during which period many projects, involving an outlay of from \$15,000,000 to \$25,000,000, have been proposed. When it became evident that the tunnel railroad could be built for about \$2,500,000, it was decided to carry out the project, the details of which have been frequently referred to in past issues. It may be remembered that an independent company was formed for the management of this tunnel road with Mr. Wyndham Portal, Chairman of the London & South Western, at its head. Plans were prepared by Mr. W. R. Galbraith and Mr. J. H. Greathead, the local supervision of the work being entrusted to Mr. H. H. Dalrymple-Hay. Mr. Greathead died during the progress of the work and his place was taken by Prof. Kennedy, who directed the electrical work.

The initial trip, made July 11, showed that the run from terminus to terminus could be made in five minutes, the distance being about 1½ miles. Each complete train is made up of four cars, two motor cars and two middle trailers, each car being carried on two 4-wheeled bogies. The front and rear cars will each carry two motors and the seating accommodations in the motor cars will provide for 46, while the ordinary coaches will seat 56, making the total seating accommodation of one train 204 persons. Provisions have been made for but one class of passengers, namely, the first class, and the fare is 2d. single, and 3d. return.

The car bodies were supplied by the Jackson & Sharpe Co., of Wilmington, Del. These were mounted at Eastleigh, and the Westminster Gazette, in commenting on this order, says that "it is a noticeable fact that it is cheaper to get cars built in the United States and brought here, than to give the orders to home firms—and you get better cars, too." The cars are equipped with the Westinghouse air brake.

Electrical power is supplied from a large generating station which has been built at the Waterloo end of the line. In this station are five boilers, engines and dynamos, each complete equipment capable of giving about 300 H. P. The current is supplied to the cars by means of a heavy channel-shaped steel rail laid between the rails. The current is used at about 500 volts pressure.

A report of the company shows an expenditure up

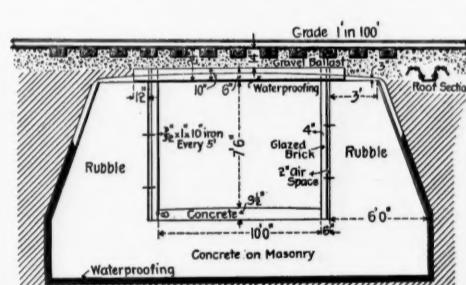


Fig. 4.—Foot Subway, Readville Station.

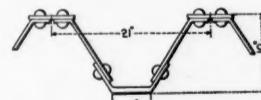


Fig. 5.—Section of Floor Above Foot Subway.

the railroad and Charles River, was accessible to the highways only through these farm crossings. It was necessary therefore to extend Belle avenue, 30 ft. wide, for a distance of a mile and a quarter between the river and the railroad. Of the eight crossings replaced, five have been placed under and three over the railroad. No grade changes on the main line of the Boston & Providence were made, and no grade crossings abolished, because none existed within the district, but a new bridge crossing was made at Allen street, 4,000 ft. north of Readville. This street was carried over the railroad, and it was also carried over Mother Brook and over a private way by two other bridges. There is one other new bridge where Belle avenue extension crosses the same stream, two new highway bridges at Readville due

to June 30 last of \$2,556,585, leaving a balance of \$143,415 on the total capital, the entire amount of which has been raised on ordinary stock. The entire cost of the road and its electrical equipment is fully covered by the authorized capital of the company. For further particulars regarding the engineering features of this tunnel road, the reader is referred to the Railroad Gazette of Feb. 4, 1898, p. 77.

Tests of a Baldwin Locomotive on the Louisville & Nashville.

Some interesting service tests were made on a Baldwin consolidation freight locomotive during the latter part of May by Messrs. A. C. Eastwood, J. M. Lansden, Jr., C. Pirtle and B. Wiley of the graduating class in Rose Polytechnic Institute, Terre Haute, Ind., working under the direction of Prof. F. C. Wagner.

By the courtesy of Mr. Pulaski Leeds, Superintendent of Machinery, and Mr. W. M. Newbold, Division Superintendent, these tests, seven in number, were made on the South and North Division of the Louisville & Nashville, between Decatur, Ala., and Birmingham, Ala., a distance of 86 miles. The train load was in every case as nearly as possible the rated load for the engine over that section of the road. Every effort was made to keep the conditions the same during the different runs, the same engineman being in charge during all but the last test, and the same fireman during all but the first and last tests.

The objects of the test were to compare different kinds of coal and to determine the efficiencies of the boiler and the engine, such other data being obtained as would show the general performance of the locomotive. A dynamometer car belonging to the Chicago, Milwaukee & St. Paul was used during the last three tests to determine the train resistances under different conditions, but complete records were not obtained. The principal results got with the dynamometer will be given in the near future.

The locomotive had been in use about eighteen months, and just previous to the tests the valve seats were faced off, new piston rings inserted, and new driving boxes put in. As a result, the engineman was obliged to favor the engine a great deal in the first two or three tests, until the bearings wore to a fit. A considerable number of the boiler flues also were renewed while the engine was in the shop. About the middle of the time occupied by the tests a leakage test of the boiler was made, and the boiler was found to be tight under the working steam pressure.

The usual observations were taken every ten minutes during the run, and special care was taken to determine accurately the coal and water consumption. The coal was weighed into sacks, and the time of dumping each sack was noted. At the end of the run the number of empty sacks was counted as a check upon the record.

Only one injector was used to feed the boiler, and in the suction pipe of this injector was placed a Hersey water meter. The water meter was calibrated both before and after the test, and once during the test. As a check upon the readings of the water meter, the tank in the tender was calibrated and readings of the water level in it were taken at the beginning and the end of the test, and also just before and after filling. The inclination of the engine at the time the tank readings were taken and also when the water level readings in the boiler were taken, was determined by means of a suitable instrument located in the cab.

The power developed in the steam cylinders was measured by two integrating indicators, one on either cylinder. This indicator, shown by the accompanying engraving, was designed by Prof. C. S. Brown and made in the Institute shops. It consists of a double indicator piston, whose motion is opposed by a properly calibrated spring, a sliding carriage carrying an accurately turned cylinder and recording mechanism, and an oscillating shaft with a lever arm which receives motion from the piston rod of the indicator; the shaft also carries a friction wheel which bears upon the surface of the cylinder or drum. The instrument is so constructed and connected that the steam pressure from one side of the engine piston acts upon the lower end of the double piston and that from the other side upon the upper end, the space between being open to the atmosphere for the escape of any steam that may leak past the pistons. The sliding carriage is given a motion corresponding to that of the engine piston by means of a pantograph, or some other form of reducing motion. By reason of the friction wheel the cylinder is caused to rotate during each stroke an amount depending upon the inclination of the plane of the friction wheel to the axis of the cylinder. The position of the friction wheel is governed by the motion of the indicator piston. If the position be the same on both forward and backward strokes, the cylinder will revolve equal amounts in opposite directions and the resultant movement will be zero. If the position of the friction wheel is different on the forward and backward strokes, as would be the case when work is done in the engine cylinder, then the resultant rotation of the drum will be proportional to the difference between the average inclinations of the friction wheel on the forward and backward strokes, which

in turn is proportional to the sum of the mean effective pressures for the two strokes. Consequently the rotation of the drum is proportional to the work done in the cylinder. By a suitable wheelwork and dials reading to ten thousand, the revolutions of the integrating cylinder are recorded, and by the use of the proper constant the total work done in the engine cylinder is readily obtained. The locomotive tested was fitted with air relief valves, so that when the engine was in motion with the throttle shut the steam cylinder became an air compressor and the work done in the cylinder was negative, causing the integrating indicator to read backwards. It was necessary, therefore, to take readings at the times when steam was shut off and let on and to add the amount of such backward readings to the total for the test.

In computing the amount of steam to be charged to the engine, allowance was made for the steam escaping through the safety valve and also for that used in the air pump. For the former the number of times the pop valve opened and the duration of each discharge were noted. Observations were also made, when the engine was at rest, upon the lowering of water level in the boiler for a given duration of discharge through the safety valve. The valve worked very regularly and showed a discharge per minute which was equivalent to $\frac{1}{2}$ inch in the water glass, or 200 lbs. of water.

The strokes per minute of the air pump required to keep up the pressure in the main reservoir were counted. An amount of steam was allowed per stroke which would just fill the steam cylinder of the pump at a pressure 10 lbs. greater than the air pressure. No attempt was made to determine the steam consumption corresponding to the air actually used for braking, as the stops were few and the number of strokes made were small, compared to the total number during the test.

The quality of the steam was measured by a throttling calorimeter. The sampling nipple was tapped into the "nigger head," and the steam pipe was run through the smoke box to the outside where the calorimeter was attached. This pipe was covered with asbestos covering where it passed through the smoke box. The indications of the calorimeter showed slightly superheated steam, due doubtless to the heat received in the smoke box in spite of the asbestos covering. In all calculations the steam was treated as dry.

The temperature of the flue gases was measured by means of a platinum resistance pyrometer placed in the smoke box with the lead wires running back to the cab. A portable Wheatstone bridge, especially designed for use with this pyrometer, was set up on the left side of the cab where the readings were taken. An attempt was also made to obtain temperatures in the firebox just back of the arch. About eight readings, extending over a period of two hours, had been obtained when the porcelain tube containing the resistance coil was broken, probably by a lump of coal thrown over the arch.

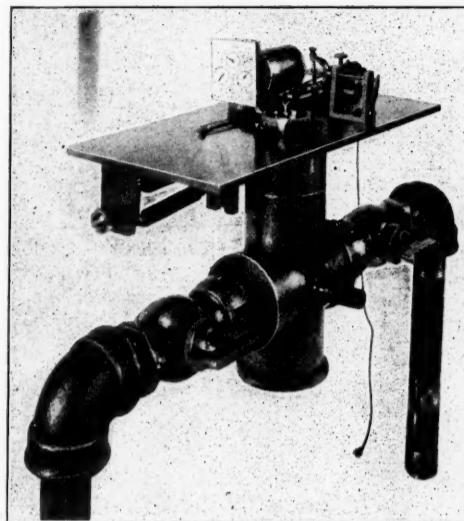
The principal dimensions of the locomotive used are as follows:

Weight on drivers.....	130,000 lbs.
Total weight of engine and tender in working order.....	233,000 lbs.
Driving wheels, diameter.....	.51 in.
" measured circumference.....	13.37 ft.
Total wheel base of engine.....	.28 ft. 8 in.
Driving wheel base of engine.....	.15 ft. 11 in.
Diameter of cylinder, right side.....	.20.12 in.
" left side.....	.20.09 in.
Length of stroke, right side.....	.25.81 in.
" left side.....	.26.06 in.
Diameter of piston rods.....	.35 in.
Type of boiler.....	Belpaire.
Number of tubes.....	222
Diameter of tubes.....	.2 in.
Length of tubes.....	.14 ft.
Heating surface of fire box.....	.181 sq. ft.
" " " tubes.....	.1,629 sq. ft.
Grate area.....	.1,810 sq. ft.

The observed and calculated data pertaining to the boiler tests are given in the following table:

evaporation are computed as per hour of running time.

During the seventh test the injector did not pick up all the water supplied to it, so that there was a continual leak at the overflow. As this leak was beyond the meter, it could not be measured or allowed for. Consequently the calculated results which depend upon the measurement of feed water have been



Integrating Indicator—L. & N. Locomotive Tests.

omitted. In the engine test, the results of which are given below, the water actually entering the boiler has been assumed to be an amount which will give the same economic evaporation as was obtained on the previous day with the same coal.

Analyses were made of coals Nos. 1, 3 and 4 with the following results, no analysis being made of coal No. 2:

	Coal No. 1	Coal No. 3	Coal No. 4
Moisture, per cent.....	1.56	1.38	1.36
Volatile combustible, per cent.....	33.43	31.27	36.17
Fixed carbon, per cent.....	59.12	59.31	55.74
Ash, per cent.....	5.89	8.04	6.73

The principal results of the engine tests are as follows:

RESULTS OF ENGINE TESTS.

Number of test	V.	VI.	VII.
Reading of integrating indicator, right cylinder	6,5520	6,599	6,593
Reading of integrating indicator, left cylinder .....	.....	7,055	.....
Foot pounds of work, right cylinder.....	2,158,350,000	2,206,800,000	2,171,850,000
Foot-pounds of work, left cylinder .....	.....	.....	2,244,950,000
Total work in both cylinders, foot-pounds.....	[4,389,300,000]	[4,487,800,000]	4,416,800,000
Total horse-power hours.....	[2,217]	[2,267]	2,231
Average total indicated horse-power	[571.3]	[581.2]	602.9
Total steam charged to engine, lbs.....	57,663	57,731	[57,121]
Pounds of steam per I. H. P. per hour	[26.01]	[25.47]	[25.61]
Pounds of coal per I. H. P. per hour	4.71	4.32	4.34
Pounds of coal per ton-mile.....	.202	.188	.187

During the fifth and sixth tests the indicator on the left cylinder was out of order for a considerable portion of the run. In the calculated results the ratio of the total work to that done in the right cylinder has been assumed to be the same as in the seventh test, when both indicators worked well for the entire run. All values depending upon this assumption have been bracketed in the table.

The figures for pounds of coal per ton mile include all of the coal used during the test. In the two pre-

RESULTS OF BOILER TESTS.

Number of test	I.	II.	III.	IV.	V.	VI.	VII.
Duration of test, hours.....	6.3	5.73	4.98	4.75	5.38	6.77	5.17
Running time, hours.....	4.77	4.05	4.08	4.02	3.88	3.9	3.7
Number of cars.....	28	27	24	21	28	26	.....
Weight of train, tons.....	608	608	625	622	623	626	620
Diameter of blast nozzle, in.....	5	5	5.125	5.125	5.125	5.125	5.125
Average temperature of feed water, degrees Fahr.....	64.9	74.7	70.4	69.6	73.0	75.0	73.0
Average steam pressure, lbs. per sq. in.....	147.6	160.8	161.1	157.1	161.3	162.6	144.1
Average temperature of gases in smoke box, degrees Fahr.....	635	650	680	680	680	680	680
Maximum temperature of gases in smoke box, degrees Fahr.....	1,085	968	.....	1,022	883	785	842
Average draft in smoke box above diaphragm, inches of water.....	3.7	3.3	2.9	3.8	.....	.....	.....
Average draft in smoke box below diaphragm, inches of water.....	2.13	1.5	1.6	2.2	2.82	2.0	2.49
Average draft in fire box, inches of water.....	.....	.....	.....	.....	1.6	1.73	.....
Kind of coal	Dry.	Dry.	Dry.	Dry.	Dry.	Dry.	Dry.
Total coal charged to boiler, lbs.....	No. 1 12,00	No. 1 11,500	No. 1 10,600	No. 2 11,000	No. 3 10,800	No. 4 10,150	No. 4 9,975
Ashes and clinkers from grate and ash pit, lbs.....	951	918	615	945	705	790	750
Cinders from smoke box, lbs.....	111	177	147	240	150	230	200
Total combustible, lbs.....	10,928	11,405	9,838	9,815	9,915	9,130	9,025
Per cent of ashes and cinders	7.92	7.98	8.50	8.59	6.53	7.78	7.52
Total water evaporated lbs.....	72,514	64,659	60,299	60,207	59,685	59,890	67,820
Pounds of water evaporated per pound of coal, actual conditions.....	6.04	5.62	5.69	5.47	5.52	5.90	.....
Equivalent evaporation per pound of coal from and at 21° Fahr.....	7.26	6.70	6.82	6.55	6.60	7.04	.....
Equivalent evaporation per pound of combustible, from and at 21° Fahr.....	7.96	7.40	7.35	7.34	7.16	7.82	.....
Pounds of coal burned per sq. ft. of grate surface per hour.....	101.4	114.5	104.8	110.3	112.2	105.3	108.7
Pounds of water evaporated per sq. ft. of heating surface per hour, from and at 21° Fahr.....	0.1	10.5	9.72	9.91	10.16	10.15	.....
Average boiler horse-power developed during running time.....	529	552	513	520	533	532	.....

In the above table the phrase "running time" is used to denote the time during which the train was actually in motion. The rates of combustion and

evaporation are computed as per hour of running time.

The Eight-Track Drainage Canal Bridge at Chicago.

In our issue of July 1 we reported the opening of the bids for the eight-track movable bridge over the Drainage Canal, near Campbell avenue, Chicago, and on Saturday last, Aug. 6, the Board of Trustees of the Sanitary District formally voted to award the contract for this bridge to the Scherzer Rolling Lift Bridge Co., Chicago. This whole matter has been up for about a year, but a fight has been made by the different competitors and there have been many con-

cent. carbon, being of the same quality as that used for tires. Fig. 3 shows the dies used to bring the ingot to the form of a circular disk. It will be seen that the face of the die is narrow, requiring that the ingot be turned from time to time. The forged disk is dropped into the flanging pocket or die on the front face of the anvil block. A groove in the top die corresponds with a groove in the pocket of the lower die, so that as the disk is revolved by the workmen the flange and tread are forged at the same time, and the center acts as a mandril. The disk comes out of the flanging pocket a blank wheel and it then only remains to form the hub and spread the metal which makes the plate. The wheel blank is passed to a second hammer fitted with dies as shown in Fig. 5, and as the forging is continued, recesses in the upper and lower dies receive the metal for the hub, while the metal is also driven against the outer walls of the dies. The small punch in the lower die forms a hole in the wheel blank and centers the metal. Each wheel necessarily has the same dimensions, and the plate and hub are forged with the tire without additional cost for the center.

With the usual steel tired wheel the safety limit for wear has been placed at a thickness of tire of 1 in., while with the solid forged wheel it is said that the tire can be safely worn to a thickness of $\frac{1}{4}$ in., due to the heavy fillet back of the tire. It is proposed to make 36-in., solid, forged wheels with a tire 4 in. thick, and after the tire has been worn 2 in. to change the wheels to another ser-

The cylinders had been disconnected from the smoke arch and left attached to the frames when the boiler was taken to the boiler shop. In the boiler shop, in addition to the repairs to the boiler, the following parts were put in place: Boiler lagging and jacket, cab, running boards, dome casing and cover complete, dry pipe, throttle valve, air pump, injectors and all cab trimmings, smokestack and a new half smoke arch. The boiler was then subjected to a hot water test and taken to the erecting shop. Here the holes in the smoke arch, where it joins the saddle casting, were reamed and the bolts fitted; also the steam pipes, exhaust nozzle, netting and diaphragm were put in and all pipe connections made. From the time the engine left the boiler shop until it was ready to be taken to the drop pit for placing the wheels was 1 hour and 45 minutes. After the wheels were in place the engine was returned to the erecting shop and completed in every detail; the valves were set and the boiler was charged with compressed air at a pressure of 100 lbs. per sq. in., and run out on to the transfer table and into the paint shop.

From the time the boiler left the boiler shop until the engine reached the paint shop was exactly seven hours. Thirty-two men worked on the engine on the day it was turned out, making a total of 184 hours, some of them only working a portion of the whole time. Mr. Fitz Gibbons states that this was not a rush job, but one done in the ordinary course of business; however, they tried to make a better record for erecting an engine than that made some time ago at Altoona, supposed to be something over eight hours.

An English Concession in China.

According to Engineering (London), it appears that at a recent meeting of the Peking Syndicate in London some very interesting information was given

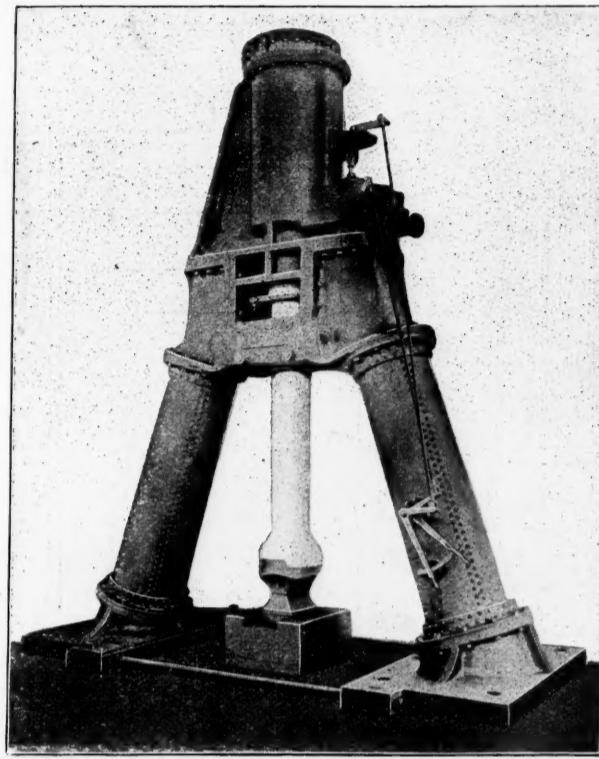


Fig. 2.—Twelve-Ton Steam Hammer for Forging Solid Steel Wheels.

flicting interests. Now we are assured by Mr. Isham Randolph, the Chief Engineer for the District, that the decision is final and that the contract is to be signed at once.

The Scherzer design of bridge was open to competitive bidding and the lowest bid received for this style of bridge was that of the Scherzer Rolling Lift Bridge Co., amounting to \$369,140 for the original fixed structure and \$429,140 for the final movable bridge complete, this latter sum has been erroneously reported to be \$510,880. The contract for the substructure will be sublet to McArthur Bros. & Co., Chicago, and the superstructure to the Pencoyd Iron Works, Philadelphia.

The design provides for four through double-track, double-leaf units of the rolling-lift type, which are each 150 ft. center to center of bearings with a clear central opening of 120 ft. Each bridge will be 434 ft. long. In general the principle made use of is the same as that embodied in the Scherzer rolling-lift deck bridges previously built on the Chicago River, but as the Campbell avenue bridge, on account of the approaches, had to be a through structure, a number of changes in the general design and details were necessary. In a future issue we shall describe the novel features of this bridge.

A Solid Steel Car Wheel.

Many who attended the recent conventions at Saratoga examined with interest the exhibit of the Facer Forged Steel Wheel Co., of Philadelphia. This exhibit showed the different stages in the forging of a solid steel car wheel from the ingot to the finished wheel. These various stages are illustrated by Fig. 1, A being the original steel ingot, B the plain disk made from the ingot, C the flanged blank wheel and D the finished wheel. The time now required to perform these operations is said to be a little less than three minutes each, but when the plant is in smooth running order it is expected that one set of men will be able to make about ten wheels an hour.

The forging is done by a specially designed steam hammer of 12 tons capacity, built by Bement, Miles & Co. This hammer is shown by Fig. 2, and consists of two base plates 11 ft. long by 6 ft. wide, placed 11 ft. 6 in. apart, and held in position by heavy bolts. These plates support two inclined frames slightly tapering upward, which are built of heavy riveted plates. The frames are joined at the top by a casting, which in turn supports the cylinder. The cylinder is 36 in. in diameter by 78 in. stroke, and the steel piston rod is 21 in. in diameter, excepting near the lower end, where it is expanded to 33 in. The valve is carefully balanced and is operated by hand. The height of the hammer over all is 27 ft. 6 in.

An ingot weighing about 850 lbs. is used for a 33 in. wheel, and the steel used has from 0.60 to 0.65 per

cent. carbon, being of the same quality as that used for tires.

The advantages claimed for the solid over the usual forms of steel tired wheels are greater safety and greater mileage at a considerably less cost. Also, there are no tire fastenings to work loose, and the tire is not affected by expansion due to hard braking. As far as safety is concerned, it would seem scarcely possible for the solid wheel to break in service if made of good material.

Re-erecting a Locomotive in Seven Hours.

Mr. J. W. Fitzgibbons, Assistant Superintendent of Motive Power of the Chicago, Rock Island & Pacific, has furnished some facts regarding the re-erection of a locomotive in seven hours at the Horton shops of that road.

The engine was of the eight-wheel type, having

out as to a concession by the Chinese Government to this Syndicate. This is the first occasion on which the seal of the Chinese Foreign Office has been affixed to such a concession in favor of an English company. The concession covers, by direct grant to the Syndicate, the sole right to work coal and iron in certain districts of Shan-Si and petroleum in the whole of the province. The coal and iron rights cover 21,000 sq. miles, in which is situated the largest known coal and iron field in the world. The province of Shan-Si extends from the great wall of China on the north, almost as far as the Yellow River on the south, and has an area of 50,000 sq. miles and a population of over 15,000,000 persons. The eastern boundary is 120 miles west of Peking and the projected railroad to Hankow runs nearly parallel with that boundary for a distance of about 100 miles.

Coal can be delivered at the mouth of the pit for 20 cents a ton, and by the use of modern methods and

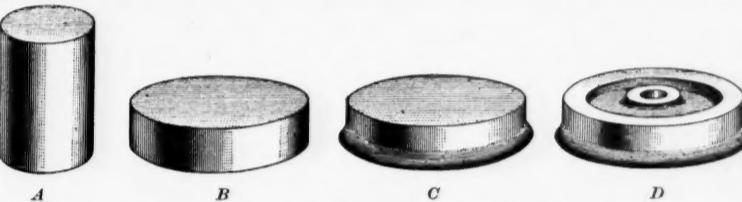


Fig. 1.—Stages in the Forging of a Solid Steel Wheel.

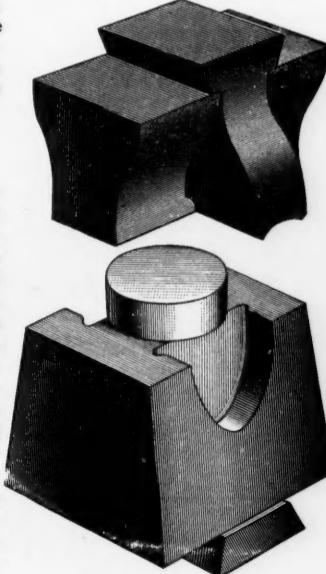


Fig. 3.

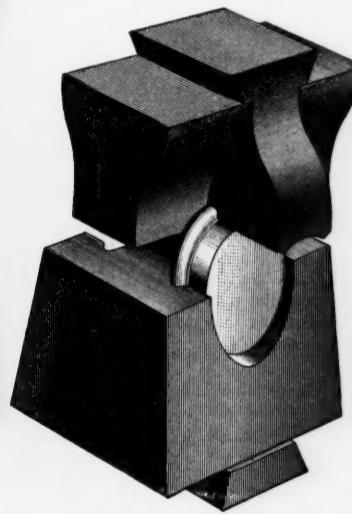


Fig. 4.

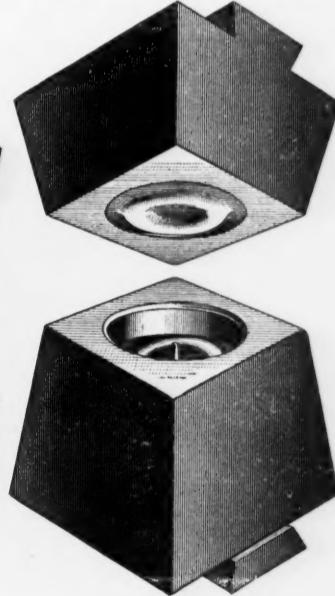


Fig. 5.

cylinders 18 in. x 24 in., and a wagon-top boiler 56 in. diameter at the barrel. The engine, which was originally built by the Schenectady Locomotive Works, weighed about 108,000 lbs. in working order, and was in the shop for repairs. The side sheets and flues of the boiler were replaced, as well as the driving axles, crank pins, rod brasses and bushings and driving-box shoes and wedges.

machinery this cost can be reduced. The cost of iron made in Shan-Si is now about \$5 a ton, but this also can be very much reduced by putting in modern methods. Obviously, the first great problem is to provide means of transportation, which means to build railroads. The Syndicate proposes to raise capital to build railroads and iron works and open the coal mines.

Light Railroads in England.

A couple of weeks ago a very interesting ceremony took place in England. It was cutting the first sod of the first light railroad to be built under the Light Railways act. This line, about 12 miles long, will be built by the London & South Western Company between Basingstoke and Alton, and it is believed that it will be opened for traffic in about 12 months.

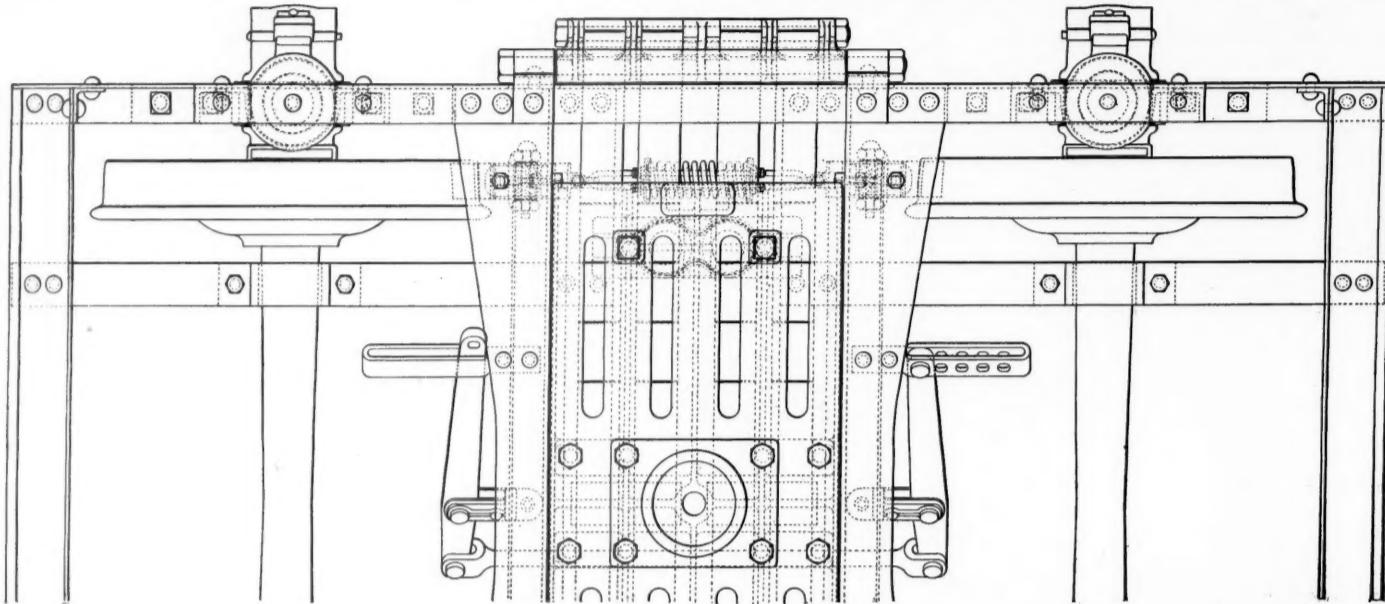
Mr. Ritchie, the President of the Board of Trade, by invitation of the directors of the London & South Western, cut the first sod, and in a speech at luncheon he said that the Board had feared at one time

vide a rigid truck frame with such a system of springs as would form a flexible connection between the wheels and truck frame, and between the truck frame and the car body.

The Locomotive Engineman, the Company and the Public.

Mr. E. L. Russell, President of the Mobile & Ohio Railroad, sends us a copy of a letter that he lately wrote to a committee of engineers representing the Brotherhood of Locomotive Engineers on the St. Louis Division of the Mobile & Ohio, and we are glad

Take the Mobile & Ohio Railroad Company. It is a corporation. Corporations can be created only by the states. The Mobile & Ohio Railroad Company is created by the states of Alabama, Mississippi and Tennessee. It derives its existence and powers from these states. Hence, as was said by Chief Justice Wait: "It exercises a sort of public office, and has duties to perform in which the public is interested." He further stated: "The business of a carrier is, therefore, affected with a public interest." To some extent it exercises the functions of government, under the powers conferred upon it by its charter. It owes legal duties to the public, to towns and to citi-



The Cliff-Tucker Steel Passenger Truck.

that these light railroads might not be approved by the old railroad companies, but that fear has passed away as the result of conferences with the general managers of the companies. There are now 121 applications before the Board for orders for light railroads, which represent a total of 1,305 miles and a capital of something like \$37,000,000. Of these applications 32 have come from existing railroad companies and 14 others are for lines to be worked by railroad companies.

It is believed that the line to be built by the London & South Western will cost about \$26,000 a mile. We are not informed what the gage is, or the weight of rail, nor have we any particulars of the character of the works or of the probable cost of right of way.

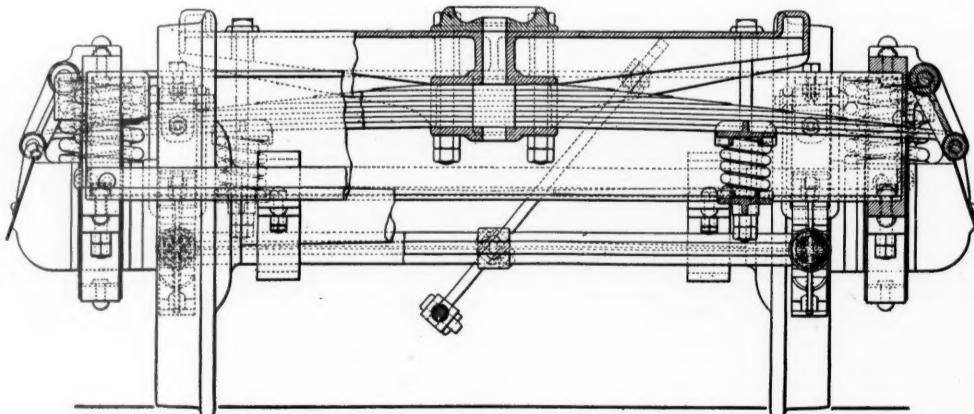
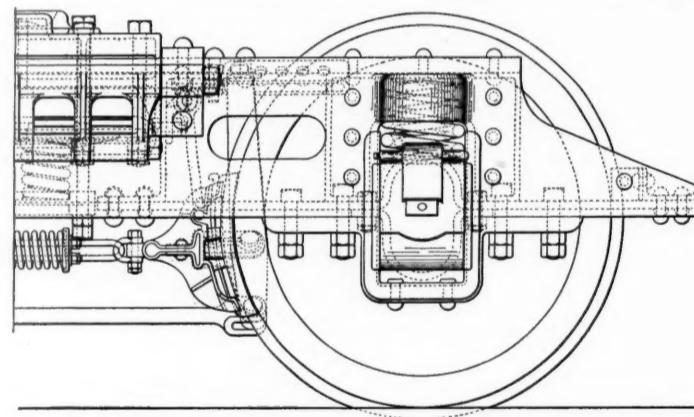
to be able to publish the most essential parts of it as being of more than local interest.

I know of my own observation that the organization of the Brotherhood of Locomotive Engineers has exercised a beneficial influence over its members. This influence has improved their skill, their morals, their intelligence, made better citizens of them, and more efficient agents in the service of the railroads of the country.

The glory of our form of government is that it

zens. The management charged with operating it is held to the highest degree of legal accountability. If, while operating it, it injures the rights of the public, destroys life or limb or injures private property and if it is called upon to answer under the law, it is required to show to the satisfaction of a jury that it has discharged its obligations with great care, skill and diligence; in other words, that neither the corporation nor its agents are responsible for such injury.

Corporations can exist and be operated only



The Cliff-Tucker Steel Passenger Truck

The side frames are made of rolled channels of special shape, the flanges being turned inside, to which the ends of the Z-bar transom are joined. The lower flanges of the transom are turned inwardly and the upper flanges outwardly, to permit of a long connection with the tops of the side frames and to give room below for inside hung brakes. The side frames extend beyond the boxes sufficiently for the end tie bars to clear the wheels, the tie bars being placed in the plane of the axle centers, so that the stresses are transmitted from one side frame to the other with the least possible leverage. The tie bars also support the outer ends of the safety straps, while the opposite ends are attached to the transom.

The side frames are cut out around the journal boxes, and the web above the boxes is pressed out to form one side of a cap for the coil springs, the other side of the cap being formed by a steel pedestal casting, which is riveted on the inside of the frame. The lower portion of each pedestal consists of a wrought-iron yoke bolted to the lower flange of the frame. Wearing pieces which can readily be replaced are fitted to the guides, and prevent the wear of the frames. Coil springs are placed directly above the journal boxes.

The truck bolster is supported on four or more long half-elliptic springs which extend through an opening in the side frames and are suspended by links; the links as shown have an outward pitch and permit of a lateral swing motion.

Each end of the bolster, just inside of the side bearings, is fastened to the bolster springs by two bolts extending from the bolster down between the springs. Each bolt has on its lower end a cup in which rests a coil spring, while the upper end of the spring bears against a plate which in turn acts against the under side of the long semi-elliptic springs. The coil springs are given an initial tension and resist the tendency of the car body toward rocking.

The special objects of the design have been to pro-

cultivates, develops and broadens individual character and individual independence. It has been my observation that the skilled labor of this country devotes more time to investigation and reading than any other class of our people. They are better informed upon economic questions than people engaged in other pursuits. It is because of this fact that I propose to call your attention to some great fundamental principles connected with the railroad problem.

through agents. The locomotive engineer is one of the most important factors connected with this operation. The legal obligation above mentioned furnishes the reason, and, I might say, the necessary for the establishment and enforcement of stringent rules and regulations. The management knows that the public, and the laws of the country, demand the greatest care, caution and prudence in the operation of its trains. And it is thereby forced, in turn, to demand of the engineers who handle the locomotive en-

gines, a very high degree of efficiency, skill, prudence and care. When a corporation is brought into court to answer for some injury inflicted, it has to show that its engineer was competent, skillful, prudent, and had a reputation for great caution in the discharge of his delicate duties as engineer. Hence, you see the necessity—the imperative necessity—for rules and regulations, and you further see the necessity for the engineers obeying these rules and regulations, made for their protection and for the protection of their comrades in the service, the lives of the public, the property of individuals and the property of the company.

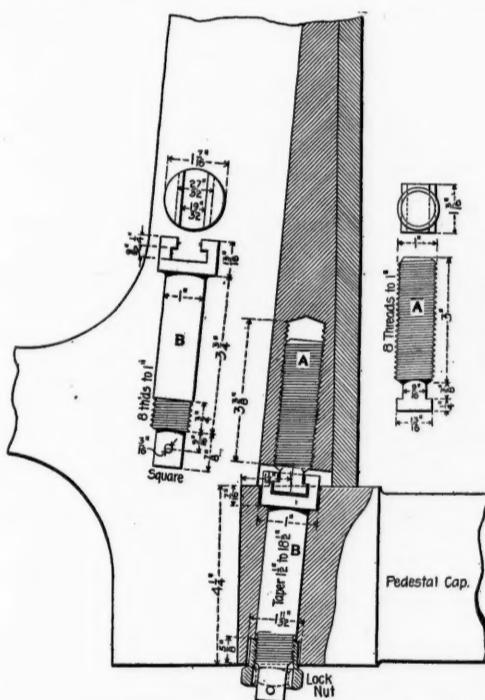
We have no fault to find with our engineers. We have been exempt from serious accidents for a long time, and if the engineers and other employees connected with the operation of trains of this company continue to exercise the same degree of diligence, prudence and faithfulness in the discharge of their respective duties, we shall continue to be exempt from train disasters.

We want you to realize that the owners of the property and the management of the Mobile & Ohio Railroad Company appreciate your services, and propose to deal justly and fairly with you, and all other employees in the service. We want every man to feel when he has been dealt with, even if he is permanently discharged, that the punishment in his case has the approval of his own judgment and conscience.

Pedestal Wedge Bolt.

On account of the difficulty of properly adjusting the pedestal shoes and wedges on locomotives with under-hung springs, a few railroads have introduced the practice of using non-adjustable wedges, which have to be set in the shop and are not under the control of the engineman. The value of this practice is still undecided, however, to judge from the number of Motive Power officers who continue to consider it a function of the engineman to tighten or loosen the wedges as the driving boxes may require.

On some Western railroads a novel design of wedge bolt is in use, which is illustrated herewith. The



Bolt for Driving-box Wedge.

wedge-bolt is placed in position parallel to the inclined surface of the pedestal jaw, and as this is the direction in which the wedge moves, it apparently requires less force to adjust a "stuck" wedge, than if the wedge-bolt operates at an angle with the line of motion. The wedge is made of wrought iron, and the bolt of steel. The T-shaped head of the bolt fits into the socket of an iron stem running through the pedestal cap. This stem is drawn up tight, to prevent it from turning, by means of a lock nut at the bottom. When this nut is loosened, the stem, which has a square end, is turned with a wrench, and the wedge-bolt thus works in or out of the wedge as desired.

Increase of Stock of the Metropolitan Street Railway Co.

An increase of the capital stock of the Metropolitan Street Railway Company, New York, from \$30,000,000 to \$45,000,000 was authorized by the stockholders on Tuesday of this week. Of the \$30,000,000 of the outstanding shares of stock, \$21,200,000 were represented at the meeting.

Of the new stock, \$5,000,000 will be held in reserve in the treasury. The other \$10,000,000 will be distributed among the present stockholders at par in

proportion to their present holdings. It is not expected that any part of this new stock will be placed on the market. The proceeds of the \$10,000,000 of new stock issued will be used to retire certain outstanding obligations of the Metropolitan company to meet the cost of the extensive reconstruction of many of the present horse-car lines. President H. H. Vreeland says that when the entire Metropolitan system has been perfected as planned, it will be possible for a person to ride from any part of New York to any other part of the city reached by these lines without change of cars. Further, Mr. Vreeland is quoted as follows:

"In the morning, when business men are eager to get down town, we will run a large number of cars quickly and directly into the business section from every point uptown. Cars from Second Avenue, Lexington, Madison, Sixth, Eighth, Columbus and Amsterdam Avenues will all turn into Broadway at convenient points. Early in the evening, when the business man wants to get home, he can take a car downtown that will carry him without change wherever he wants to go on any of the uptown avenues. We shall also be able to provide systematically for the convenience of the shoppers in the afternoon. At certain hours a large proportion of the cars on the uptown lines will be run direct to the shopping district. Cars from Amsterdam, Columbus, Eighth, Madison and Lexington Avenues will be run through Fifty-ninth street and down Sixth Avenue, and back again. During the evening, when people want to get to the theatres, all of our uptown lines will converge into Broadway."

Does the Present Style of Vertical-Plane Coupler Meet all Requirements; Has It Come to Stay?

A concise statement of my opinion would be an emphatic negative to the first question; and an equally emphatic affirmative to the last, and "What are you going to do about it?" It seems to me scarcely credible (or creditable) that the adoption of this device should have resulted from careful investigation and consideration of the conditions and requirements of service: first, that the concussion should be evenly and squarely met on a central line; second, that the pulling strain should be on a central line to avoid all tendency to crowd the flanges against the rail; third, that the connection should be so flexible that there should be no unnecessary friction at any time, or difficulty in coupling on any practicable curve; fourth, that the device should be capable of having its strength increased to meet future requirements of heavier motive power; fifth, that it should be always operative; sixth, that there should be as great a uniformity as there was in the link and pin.

In my opinion the present style of vertical-plane coupler contains none of these essentials. When cars are thrown together the greater part of the blows are received at the point of greatest adverse leverage, far outside of the center line of column. In pulling, the line of strain is considerably out of center. The connection is not as flexible as it should be, as for obvious reasons the bar must not have any great amount of lateral movement; hence, where there is an appreciable difference in the overhang of two cars, as in the case of a car with a six-wheeled truck coupled to one with a four-wheel, there is a great leverage tending to crowd the car with the shorter overhang off the track. Not only has this been demonstrated by the derailing of tenders where this rigid connection has been made, but it can be easily demonstrated by diagramming a four-wheel baggage or express car, built without platforms, and a six-wheel car with such platform. The centers of the couplers will be several inches out of line with each other, and it has been demonstrated that in order to force them into line a transverse pressure of upwards of 50,000 lbs. has to be exerted. While these are exceptional cases, the same holds good in degree throughout our whole equipment, and taken in connection with the "demolition grind," both vertical and horizontal, caused by the motion of the cars and a rigid sliding bearing, as against the pivoted action of the link and pin, not only causes our trains to pull harder, but is destructive to both equipment and track.

This device was adopted when the car equipment and motive power were a great deal lighter than now, and the lines that were adopted were those that had been produced to meet the requirements of that time and in competition commercially with the link and pin, and as those lines were such as precluded the possibility of increasing the proportions, the only increase in strength lies entirely in the quality of the material used, and the temptation to consider first cost is so strong as to, in a great measure, defeat this measure; in fact, this point of first cost is so strong that there are couplers in which the weight has been reduced from the original construction, enabling the manufacturer to reduce the price per car while getting practically the same price per pound.

As to the unlocking devices being at all times operative, it can be safely said that any coupler which can be fairly criticised upon fixed mechanical principles as likely to give trouble at a given point will, after a certain amount of strain and wear in service, surely prove troublesome at the point thus criticised. This criticism can fairly be made upon mostly all couplers in service to-day; thus any coupler of a design likely to break or get out of order readily, to couple with great difficulty under some of the ordinary conditions of service, to come uncoupled, not to uncouple when required, is faulty, and such de-

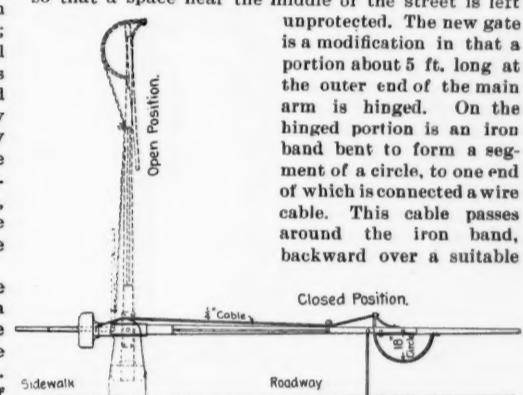
fects are more likely to develop when all cars are equipped with the M. C. B. couplers.

While it is incumbent upon us to so construct our draft rigging as to render the danger of bars pulling out as small as possible, still it is a fact that they do so, and also that bars break, in which case we lose the old safeguard of the link and pin holding the head or bar up until the train is stopped; hence there has been an element of great danger introduced, and which no effective device, so far as I know, has been provided to meet.

But allowing that there are some who agree with me, please answer the query, "What are we going to do about it?" The great number already applied, and the fact that within a short period all cars must couple automatically by impact, make it the standard of the country; and further, the fact that all couplers of the future must couple with this type prevents not only the introduction of any other type, but any improvements in this type as to the essential of strength. As I have heretofore remarked, these outlines were designed to meet the requirements of a service when the heaviest motive power were such as are now being retired from service as being too light for economical operation, and while the ultimate tensile strength of the bar may still meet the requirements of the increased motive power, still the most destructive agency has been increased in the same proportion, i. e., the blows received in yards from moving cars of from 90,000 lbs. gross weight, as against those of about 50,000, the velocity being a variable and unknown quantity, but probably not decreased, yet with all its faults we have it still, and, with the immense sums expended upon it we are likely to have it for many years to come; therefore the only thing we can do is to try and make it the most effective, serviceable, economical and least dangerous possible.

A Modified Crossing Gate.

The Bogue & Mills Manufacturing Co. has lately brought out a crossing gate designed for use where steam railroads are crossed by streets in which overhead trolley wires are strung. With the usual style of crossing gate the movable arms have to be shortened to avoid interference with the overhead wires, so that a space near the middle of the street is left unprotected. The new gate



unprotected. The new gate is a modification in that a portion about 5 ft. long at the outer end of the main arm is hinged. On the hinged portion is an iron band bent to form a segment of a circle, to one end of which is connected a wire cable. This cable passes around the iron band, backward over a suitable pulley, and is connected to the sidewalk gate. In this way when the gates are open the extension piece is held vertically, while it is horizontal when the gates are closed. The entire roadway is therefore protected by the gate when closed without danger of damaging the overhead wires when the gates are raised. A number of gates of this style are now in use and working well.

The Flow of Water in Pipes.

Mr. Theodore W. Snow of the U. S. Wind Engine & Pump Co. in a paper entitled "Locomotive Water Supply," presented before the Western Society of Engineers, gave some examples of the variation between the theoretical flow of water through straight smooth pipes and the actual flow. He said in part:

In designing a water station for a large railroad recently, the problem given was to obtain 4,000 gallons per minute through a distance of 350 ft., the head and size of supply pipe to be sufficient to accomplish this result. The mean head of water supply was made 38 ft.; from this must be deducted 12 ft. for height of crane, leaving a net head of 26 ft. In computing this flow an allowance of 10 per cent. was deducted for the friction of the water column. In figuring this discharge, Mr. E. E. Johnson's curve of discharge was used, and comparing actual result with theory, we fell short only 400 gallons per minute.

This is pretty fair for practice, for considering that all table makers are careful to state that only "straight smooth pipes were used" (they want no "curves"); we laymen have to make due allowance for the cast pipe of commerce, which usually is anything but smooth and not always straight. The bell and spigot connection causes considerable disturbance to the flow, setting up what in electrical parlance would be termed Foucault currents.

In the station just referred to the supply pipe was further observation:

In the station just referred to, the supply pipe was 12 in. in diameter and the crane 10 in.; the distance as stated was 350 ft., and the discharge was 1,600 gallons in 25 seconds, or at the rate of 3,840 gallons a minute. Under the same conditions with 1,000 ft. of 12-in. pipe and a similar crane, this flow was reduced to 3,000 gallons per minute, due solely to friction. Comparing this again with Johnson's curve above referred to, we find that we should have obtained 3,300 gallons.

Again with 350 ft. of 14-in. pipe and a 12-in. crane, with three 90-deg. elbows, we obtained a discharge of 3,500 gallons in 48 seconds, with a net head of 12 ft. A comparison of the same tables will show a uniform discrepancy.

*A paper by P. Leeds, Superintendent Machinery L. & N. R. R., before the Central Association of Railroad Officers.



ESTABLISHED IN APRIL, 1856.
PUBLISHED EVERY FRIDAY.
At 32 Park Place, New York.

EDITORIAL ANNOUNCEMENTS.

Contributions.—*Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussion of subjects pertaining to ALL DEPARTMENTS of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

Advertisements.—*We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give our editorial columns our own opinions, and those only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers, can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially either for money or in consideration of advertising patronage.*

The New York Central and the Michigan Central announce the withdrawal, at the end of this week, of the North Shore Limited trains. These trains leave New York at 10 a. m. and Chicago at 4 p. m., running through each way in 24 hours. To persons acquainted with the facts recounted in our editorial concerning the New York-Chicago fast trains July 22 this action will not be much of a surprise; but it is to be noted that, besides the telephone competition, there are, in the case of the Central, two other elements which help to explain this diminution of the number of trains; first, the Central has, in addition to this, one 24-hour train which furnishes practically even competition with the Pennsylvania's one train; and second, the non-limited trains are now so fast that they take travel away from the Limited. The mail train leaving New York at 8:45 a. m. runs through to Chicago in 24 hours; and, though the advertisements say that it takes no Chicago passengers, there is no law against going on to Chicago after one reaches Buffalo.

The staff departments of the army seem to have fallen to quarreling (if the newspapers do not lie, which is not impossible) over the matter of supplies for the troops in the field. The Subsistence Department says there was food enough and the Medical Department says there were enough hospital stores, but both say that the Quartermaster's Department did not deliver them. Our only professional interest in the matter is that the Quartermaster's Department is, among other things, the department of transportation. We have neither the time nor the inclination to investigate this quarrel, if quarrel there is, nor do we suppose for a moment that anyone outside of the army and Government circles can yet command facts enough to justify an opinion one way or the other. There is, however, a pretty good body of evidence which goes to show that the movement of troops and supplies was often pretty badly managed, even before they left the United States. Yet our country is particularly rich in the means of transportation and in men who are masters of the art. If the Quartermaster's Department did not do its work well it was not for want of means. Of course we do not speak of the movement of supplies to the front from Daiquiri. There was a peculiarly hard set of conditions—no wagon roads, no wheeled vehicles, and constant rains. It was inevitable that the troops should have suffered for food, and it would be ungenerous to blame the general in command or any of the staff departments for the lack of supplies at the front. Indeed, we judge that when the full story of that little campaign is told we shall discover that it was, for the time it lasted, a campaign of peculiar hardship. The writer of these lines walked from Washington to Petersburg with the Army of the Potomac in the Wilderness campaign of 1864, and that was a pretty rugged campaign; but he does not remember ever to have actu-

ally suffered for want of food, nor does he remember many such hardships as our troops seem to have endured in the movement on Santiago, excepting always the matter of fighting. In the fighting, of course, there can be no comparison of those campaigns. In the duration, obstinacy and severity of the fighting the Wilderness campaign was one of the greatest of history, and there the work of the staff departments, including the Quartermaster's Department, was grand.

The Nicaragua Canal.

The war has stimulated conversation about the Nicaragua Canal, concerning which Senator Morgan has never been reticent, and recent events have made him no more discreet than he used to be in talking of it.

We read from him and others that the Walker Commission has found that the canal can be built for a great deal less than the estimates of the Ludlow Commission. We read also that some events of the war have shown the necessity for such a canal, as, for example, the voyage of the Oregon, which might have been much shortened had the canal existed. We read that the annexation of Hawaii makes the building of the canal certain, and that under the changed relations of our Government to the rest of the world the United States itself must build the canal as a Government; and we read further, and here one may find much of the milk in the cocoanut, that the United States Government will have to pay \$11,500,000 to the Maritime Canal Co., part of this being for work done and a large part for the concessions.

All of this is interesting, but it is quite premature; it takes too much for granted. Let us analyze these statements a little and see what they amount to.

The Walker Commission has made no report. It may not make any report during the next session of Congress. Its surveys are not completed; and even if they were, a report to the newspapers, or to Senator Morgan, or to Mr. Warner Miller, would be in the last degree improper. The report when made will be to the President of the United States. On this we can rely, for Admiral Walker is trained and experienced in official proprieties.

The Oregon might have gone through the canal had it been built, or she might not have done so; that is a matter concerning which we should like to have the opinion of, let us say, Admiral Sampson and the Naval Board of Strategy, rather than the opinion of a correspondent of the Associated Press. Even the laymen, however, can see that there were possibilities of great danger in taking the Oregon through the canal. A little dynamite could have wrecked a lock and left her hopelessly stuck high and dry; and the capture of the Cristobal Colon would have been the job of the Brooklyn, the New York, and perhaps the Texas.

Or, it is conceivable that Admiral Cervera, knowing that the Oregon was coming through the canal, could have lain in wait with his squadron to pounce upon her as she emerged at Greytown. Of course this would have been a troublesome half hour for Admiral Cervera, as Captain Clark would never have surrendered his ship. It would have been his plain duty to fight until he sank; and given a man like Captain Clark, with a ship like the Oregon, and a situation such as we have imagined, and he would have been an ugly customer to tackle. Still he probably would have been sunk had he been attacked by Cervera's fleet.

But, furthermore, supposing that it had not been decided to bring the Oregon through the canal, but around the Horn; then Admiral Cervera, arriving in the Caribbean with his fleet, might have chosen himself to go through the canal instead of going into the harbor of Santiago. Then, unmolested he could have ravaged the Pacific Coast and conquered a coal supply and a refitting harbor which would have enabled him to start for the Philippines, visiting, on the way, our new territory in Hawaii, and finally making things unpleasant for Admiral Dewey.

It is not clear that the annexation of Hawaii involves the building of the Nicaragua Canal. Assuming that that canal will be built through neutral territory and will be free to the nations of the earth, as is the Suez Canal, it makes a short cut to Hawaii for our rivals in trade and war. The "War Lord" of Germany, for instance, could save about 3,000 miles by sending his ships to Hawaii through the Nicaragua Canal instead of through the Suez Canal. But if there were no Nicaragua Canal our fleets lying on the Pacific Coast would have a great and obvious advantage over Germany or any other Euro-

pian power in naval operations involving Hawaii, and something of the same considerations govern in looking at this matter from the commercial point of view.

But further, how or why will the United States Government build the canal as a Government enterprise? What has happened in this war to make that possible? It would involve a new treaty with Nicaragua and new treaties with the nations of the world. Obviously we cannot take possession of Nicaragua or even of a strip of Nicaraguan territory broad enough for a canal without accounting to the world for our conduct.

And finally, why should the United States Government pay \$11,500,000 to the Maritime Canal Company, more than half of this for concessions, when the company owns no concessions? As we understand it, the Government of Nicaragua claims that the concessions which the Maritime Canal Company is trying to sell have long been forfeited. A good many months ago the Minister of the Central American Republics said this definitely and explicitly to the Government at Washington, and we do not understand that any competent power has ever decided that he was wrong in saying it. If that is true, the canal company has no concessions to sell.

To sum up then: When we have done with some of the more pressing questions arising from the war and get ready to take up the Nicaragua Canal matter we shall have to adjust a number of things; and meantime it might be well enough to suspend judgment, for obviously there are several grave questions that cannot be settled by the dictum of any advocate of the canal company, paid or unpaid.

Tank Capacity of Large Freight Locomotives.

The required capacity of locomotive tanks depends mainly upon the weight of steam used by the cylinders per stroke, the size of the driving wheels and the distance between water stations. The other factors remaining constant, any change in the locomotive which materially increases the amount of water passing through the cylinders should naturally result in tenders of larger size; yet it appears from some recent designs of heavy freight engines that while much attention has been given to increasing the weight of the locomotive and the capacity for using steam, no provision has been made for carrying a greater supply of water in the tender.

The whole question of the water supply for locomotives is troublesome, requiring a different treatment for each road and different divisions of the same road. Many factors have had to be considered in locating such stations which are entirely beyond the control of those in charge, so that the distance between water tanks is by no means uniform. This distance for comparatively level roads in the Central states can probably be taken as about 20 miles, but where there are many long grades, from 10 to 15 miles is nearer the average distance. These stations have largely been established with reference to the requirements of the small engines used a number of years ago.

Our records show that the tenders of consolidation locomotives built between the years 1890 and 1894 had water capacities ranging from 3,000 to 4,300 gallons, but the 4,000-gallon tank was most commonly used. Since that time, and especially during the past year, the water capacity of tenders for heavy freight engines has been increased, until the usual size is about 4,500 gallons. It is likely, however, that the water capacity will have to be made still greater, and as an indication of the movement in this direction it may be pointed out that the Chicago, Burlington & Quincy has built some 5,000-gallon tanks, and the Pennsylvania a 6,000-gallon tank for the class H-5 "pusher;" the latter, so far as we know, is the largest tender built up to this time.

So far, most of the extremely heavy locomotives have been designed as helpers, to be used in special service, so that the question of their water capacity has not been a very important one. Some roads, however, are contemplating using locomotives of about the same size in ordinary road service, where their "radius of action" must be much longer, and it would seem that if these should be worked to their full capacity there might be difficulty in getting from one station to another with the usual amount of water. Also, the growing practice of rating locomotives on a tonnage basis greatly increases the loads hauled, and it is reasonable to think that the big engines now building will be loaded up to the maximum, and that a large part of the work will be done at long cut-offs and at slow speeds. In fact, this is the penalty which must be paid for hauling heavy loads.

To show what may be the water requirements of

a heavy freight locomotive we have used the dimensions of a recent design, and calculated the distance that such an engine can probably be run with one tank of water under the given conditions. This engine has cylinders 22x28 in., a 4-in. piston rod, 56-in. driving wheels, a working steam pressure of 200 lbs. per sq. in., and about 2,000 sq. ft. of heating surface. The pressure at the point of cut-off was taken to be 180 lbs. per sq. in. when cutting off at $\frac{1}{4}$ and $\frac{1}{2}$ stroke, and 190 lbs. per sq. in. at $\frac{3}{4}$ and $\frac{7}{8}$ stroke. The compression at the end of the stroke was taken as 150, 100, 40 and 25 lbs. per sq. in. at $\frac{1}{4}$, $\frac{1}{2}$, $\frac{3}{4}$ and $\frac{7}{8}$ cut-off respectively. It was also assumed that the clearance space was equal to 8 per cent. of the cylinder volume, and that 25 per cent. should be added to the water shown by the indicator to account for losses up to cut-off, due to cylinder condensation and other causes. From these data the weight of steam used per stroke was calculated for the different conditions of cut-off, as well as the distance run with one tank of water. The latter results are given in the table:

Miles Run per Tank of Water.

Cut-off	4,000 gallons	4,500 gallons	5,000 gallons	6,000 gallons	8,000 gallons
$\frac{1}{4}$	27.2	30.6	34.0	40.8	54.4
$\frac{1}{2}$	13.2	14.9	16.6	19.8	26.5
$\frac{3}{4}$	8.4	9.4	10.4	12.5	16.7
$\frac{7}{8}$	6.6	7.4	8.2	9.8	13.2

Attention may be called to the rapid increase of the water rate as the cut-off is increased, and this is one reason why greater tank capacity will probably be needed for modern freight engines, as, being loaded more heavily, they will be worked a greater part of the time at long cut-off. Also, on some roads where there are long, heavy grades, it is quite reasonable to suppose that it may be necessary to exert the full power of the engine for several miles, and in such cases tanks of ordinary size will evidently be insufficient.

The figures are by no means conclusive, yet they indicate that the capacity of the tender as well as the locomotive should be increased if greater loads are to be hauled. It can also be said that an equivalent to increasing the tank capacity from 15 to 20 per cent. is obtained by the use of compound cylinders, but, strange to say, the heaviest freight engines built during the past year have been simple engines.

The Chicago & West Michigan has for some time had gates on the cars of its passenger trains, using them to regulate the ingress and egress of passengers after the plan in use on the Chicago & Alton and on a number of roads in Texas; and, as everywhere else, the drummers are very much incensed at the regulation. At Grand Rapids lately there was a meeting of drummers to see about their usual annual picnic, and the principal feature of the discussion was the car gates. The ostensible ground of the objection was, of course, the damage to the commercial traveler's hat (and his feelings), while standing out in a pouring rain to have his ticket examined, this argument being backed up by a number of harrowing stories about women whose small children had been broken down in health (or killed) while the mothers were compelled to stand in the blazing sun to let the ticket examiner admit other passengers to the cars ahead of them. Mr. DeHaven, General Passenger Agent of the road, was present at this conference and made a strong defense of the gates, but we cannot find from the report that he made any more impression on his auditors than he would if he had talked in Chinese. He presented a very forcible argument, however. In addition to the usual points, already familiar to our readers, he said:

"The gatekeeper, instead of being an obstacle, is an assistance to women traveling alone with children and with bundles, providing, only that they have secured at the ticket offices, which are maintained at many of our stations at serious loss, the proper transportation. He takes from such their bundles, and, if they will trust him with them, will carry them in after all passengers have been admitted. He is similarly a great assistance to those getting out of the train. All people flow in and out in an orderly manner in the same direction; there are no conflicting currents. It is not a new plan—it is observed on all boat lines and without protest. The practical working of the scheme has demonstrated not only that a given number out and in at a station can all be handled in a less time than by the former methods, but, with the exception perhaps of holidays, when there are many people traveling who do not have baggage, the proportion of trunks and express matter requires more time for taking out and placing in the baggage car at a station than does the exit and entrance of the passengers. This question has been discussed quite extensively with individuals, and in every case in my recollection, the complaint rests entirely and solely on the claim that it is not fair to ask a passenger to show his ticket when entering the train. If this is the real objection (and we are assured it is), it seems a very slight request on the part of the railway company, even if the claim be well founded. When we explain to our best friend, the commercial traveler, the many advantages to the railway company, the securing of which aids in the promotion of

better service for the patron, a normal condition existing between two inter-dependent parties, such as we are, ought to manifest itself by a spirit of cooperation and which should say, 'All right; if this is a good thing for you, it must result in a good thing for us, and we will join with you in a fair trial of it.' Throughout his remarks Mr. DeHaven spoke on the assumption that the drummers were the friends of the road—an exceedingly generous assumption.

The Vanderbilt roads have at last started a reform which it has long been agreed was highly desirable, and which has been the subject of much discussion. On Oct. 1 the fast freight lines operating over the New York Central, the Lake Shore and the Michigan Central, and those operating over the West Shore, the Michigan Central and the New York, Chicago & St. Louis, will be consolidated into two general systems. The first will comprise the present Red, White, Midland, Blue and Canada Southern lines, operating over the New York Central, the Lake Shore and the Michigan Central. These are to be placed in charge of Mr. F. L. Pomeroy as general manager. The other will comprise the North Shore Dispatch, the West Shore Fast Freight, and the Nickel Plate Fast Freight lines, operating over the West Shore, the N. Y. C. & St. L., and the Michigan Central, and will be in charge of Mr. W. F. Wilson, General Manager. A reorganization of the accounting departments of the lines will also be made at the same time. A clearing house will be established at Buffalo, in charge of Mr. G. G. Street, now General Manager of the Blue Line, with the title of General Accountant, where the accounting of all the lines, which is now done separately, will be consolidated. This refers, we suppose, only to the claim and car-service managers, which has always been done by the line managers, and not to the division of traffic earnings, which is managed by the railroad companies directly. Consolidations in the traveling and other outside agencies will also be made wherever it is found practicable to do so. Just how radical this will be will not be determined until after the managers of the roads have had a meeting and canvassed the situation. No official estimate of the saving to be effected is given, but it is probably safe to say that the present force can be reduced one-third, effecting a saving of at least \$250,000 a year. At all events there is not a particle of doubt that the business could be just as efficiently conducted with two-thirds the present force of men.

The unsatisfactory nature of some of the recent tests of boiler coverings has prompted the Chicago & Northwestern and some of the makers of boiler laggings to make a series of comparative tests of various coverings under actual working conditions. Prof. W. F. M. Goss has been selected to conduct the experiments, and has planned the tests and apparatus. Our latest information was that the work would begin on Monday, Aug. 8, and that at least a week would be required to complete the programme. The makers of asbestos and magnesia sectional lagging are naturally prominent in these tests, and against these materials a plastic covering now extensively used by the Chicago & Northwestern will be tested. The general scheme of the experiments is to use two locomotives, the forward one being without fire or water and carrying about 180 lbs. per sq. in. steam pressure, the steam being piped from the boiler of the second locomotive, which will be of larger size than the first, and will carry a working pressure of about 180 lbs. per sq. in. The forward engine will be successively lagged with the coverings to be tested and pushed over one of the divisions out of Clinton, Ia., a constant steam pressure being maintained in the boiler of the forward engine, while the water of condensation will be collected in the forward tender and weighed at the end of the run. The amount of steam condensed will form the basis for comparison of the different coverings. Observations will be taken as to speed, temperature, etc., which will furnish data to determine as nearly as possible the conditions prevailing during each test. We do not believe that tests of coverings for locomotive boilers have ever been made on such a large scale under conditions more favorable to a fair, unprejudiced trial.

Another serious rate disturbance has broken out in the Chicago-St. Paul territory. On Aug. 5 the Chicago, Milwaukee & St. Paul gave notice that on Aug. 9 it would reduce fares between Chicago and St. Paul from \$11.50 to \$8, and between Chicago and Omaha from \$12.75 to \$9.25, in both directions. The reason given for this action was "to meet competition." The Chicago, Burlington & Northern, and the Wisconsin Central followed suit by reducing rates from Chicago to St. Paul to \$8 in both directions. The Northwestern and the Rock Island promptly met the reductions, and the Atchison has used the rates as basing rates via Kansas City. A meeting of the Western Passenger Association was hastily called for Aug. 9, but was not held, owing to non-attendance of important members. All lines are now quoting the \$8 basis to St. Paul. Kansas City rates are still \$10.50, but are likely to be down to \$9.25 by the time this statement reaches the reader.

The agreement of the new Southwestern Passenger Bureau has received its first jolt and it remains to be

seen whether it will stand it. The International & Great Northern was complained of for violating the agreement by making concessions for the movement of the Texas volunteers from Galveston to New Orleans, after rates had been agreed upon by the Association. The Conference Committee, after investigation, found the line guilty as charged, and has ordered the collection of the penalty provided by the agreement, viz., forfeiture to the Association of all the revenue received from the transportation of the entire regiment, amounting to over \$8,000.

NEW PUBLICATIONS.

A Pocket Book for Mechanical Engineers. By David Allen Low, M. I. M. E., Professor of Engineering, East London Technical College, London, New York and Bombay; Longmans, Green & Co.; 4 x 6 in.; 740 pages, over 1,000 illustrations and complete index. Price, \$2.50.

Great care has evidently been taken in the preparation of this pocket book and confidence is won from the author's statement in the preface to the effect that his spare time for five years has been taken up in the preparation of this book, and every reasonable effort has been put forth to make it accurate. In order to be assured that the tables and formulas contain no error we have tested many of them, but found none that were incorrect. Errors are inevitable in such publications, but it is safe to say that in this book they have been reduced to a minimum. Where the tables are new, or have not before been published, they have been calculated throughout at least twice, and usually by two different persons. Results of these have been compared, and wherever there was a difference fresh calculations have been made.

Considerable space has been given to machine design. The rules and data under this head are those which the engineer will most require, very little space being devoted to non-essentials. The part taken up strictly with locomotive details is concise, and so far as we have been able to determine, is reliable.

The omission of the subject of electrical engineering will detract much from its usefulness to American engineers, especially to those who have used the more recent pocket books, in which relatively considerable space is devoted to electrical subjects. The omission is evidently not an oversight, and the author may, in part, be justified, inasmuch as the book will be used principally in England, where a standard electrical engineer's pocket book is extensively used.

The drawings used were intended to bring out clearly the details of the machinery, apparatus or designs shown, but in many cases the matter has been overdone, and the finish of many of the drawings is not in keeping with the high grade of typographical work, which throughout shows evidence of the printer's care. The book is well bound, and of a convenient size.

The Cofferdam Process for Piers. Practical Examples from Actual Work. By Charles Evan Fowler, M. Am. Soc. C. E., 8 vo. Cloth, xv.+158 pages, illustrated. New York: John Wiley & Sons, London; Chapman & Hall, Limited, 1898. Price, \$2.50.

Mr. Fowler's purpose has been to occupy the somewhat neglected field of description of foundations of the more ordinary character. He starts out with the proposition that while difficult foundations have been quite fully treated by engineering writers, the ordinary ones have been often passed over with mere mention or treated only in a very general way, to the embarrassment of the great number of engineers who are frequently called upon to put in what might be called minor foundations and who are very seldom called upon to execute foundation work of great magnitude and difficulty. His first chapter of 13 pages is a hasty review of the historical field. The succeeding chapters are built up by the excellent method of collecting actual examples, describing them in detail and illustrating them carefully. These chapters are: Crib Cofferdams, Cribs and Canvas, Pile Driving and Sheet Piles, Construction with Sheet Piles, Metal Construction, Pumping and Dredging, the Foundation, Location and Design of Piers. It must not be inferred from what has been said above that the examples are confined to small and easy work; on the contrary, some very difficult foundations are described, and some of considerable magnitude. The book closes with an appendix of 20 pages, made up principally of selections from specifications taken from actual examples by Major W. H. Heuer, Corps of Engineers, U. S. A.; Mr. Edwin Thacher, M. Am. Soc. C. E., and Mr. Walter Katté, M. Am. Soc. C. E. The book is provided with an analytical table of contents and an excellent index, and altogether it must be a useful addition to the library of the practitioner and the student.

Proceedings of the Society for the Promotion of Engineering Education. Volume V. Published by the Society: Prof. Albert Kingsbury, Durham, N. H., Secretary. Price, \$2.50.

This volume has been delayed considerably in its publication, but like previous proceedings of the Society, contains much really valuable matter on technical education. Some of the more important articles were given in our issues of Aug. 20 and 27 and Sept.

3 last, with comments on a few of the more interesting topics considered. The following are among the subjects which were discussed at the last meeting, and printed in full in this volume: "Engineering Laboratory Courses," "Course in Electrical Engineering," "Uniformity of Symbols," "Methods of Teaching," "Elective Studies in the Regular Engineering Courses," "Calculus for Engineering Students," "Teaching of Machine Design," "Efficiency of Technical as Compared with Literary Training and Graduating Thesis." This volume also contains a complete list of the members, which now number 226, the constitution of the Society and a memorial notice of the late Prof. DeVolson Wood, the first President of the Society.

Application and Service Letters.*

The most brilliant and capable superintendent must depend largely on his lieutenants for success. The personnel of the train and yard service has much improved of late years, largely because of better methods in examining past records of applicants. A few years ago a yardman could get drunk and even destroy property, leave his job, and go to work in an adjoining yard the very next day, right under the eyes of his late employer; but men are coming to learn that this is a thing of the past, and that "a good name is rather to be chosen than great riches."

The investigation of an applicant's record often takes much time, causing annoying delays when help is wanted at once, and a uniform application blank and service letter should be agreed upon. There is at present great diversity among the blanks of different roads. Mr. Carson here rehearses the questions which he would require applicants to answer in writing. The list contemplates a thorough knowledge of a man's physical, mental and social history, a full record of his past railroad service and of his membership in benevolent, secret or bonding associations. There are four questions designed to emphasize the employee's legal responsibility in looking out for his own personal safety. The warning to look out for overhead bridges, etc., should be in general terms; do not attempt to enumerate every obstruction.

Handwriting is often a very instructive index of a man's character, and every candidate should be made to write his answers in ink. The physical examination should never be omitted, especially on roads which have hospitals, for men in ill health frequently seek employment on such roads so as to get hospital treatment for ailments of long standing. Men have even lain off a few days to enable a friend to work in their places, who, after getting his name on the rolls, would be entitled to hospital benefits.

"Service cards" given to employees leaving the road should be uniform on all roads. To get an applicant's record by correspondence often takes a long time; if service cards were reliable this labor of investigation could be avoided. Every man dismissed from the service is clearly entitled to a reason therefor, which should be stated in writing, and those receiving such a statement should be able to feel that it embodies the worst that may be said about them by the company making it. Every official should have the moral courage to tell the men he dismisses what he has against them, and not give it in a communication to third parties, which, even if the statements are true, may lead to legal complications. Indeed, on some roads superintendents have shown so little discretion about making replies to inquiries concerning ex-employees, involving the company in legal complications, that this prerogative has been taken from them entirely and exercised only by the general superintendent or general manager.

Even if a card shows that a man has been discharged for misconduct, it need not necessarily bar him from employment with some other company. It has been said that service cards may be forged or given away, or used to secure useless transportation; but forgeries can be easily detected and false impersonations, also, are generally detected without trouble; and the argument about misuse of cards for securing transportation is not strong, for a man can generally get hold of some card, new or old, that will answer for this purpose. As a matter of fact, it is not conductors carrying railroad men in good standing about which railroad companies are so particular as the enforcement of the rules requiring them to turn in to the company the money collected in cash fares. At some division points superintendents would often be in sore straits for men were it not that some conductor had brought in a few railroad men looking for employment.

The service card should be printed on durable paper with tinted surface that will disclose the slightest attempt at erasure. It should contain a complete description of the person to whom issued, with mention of such peculiarities as the loss of a finger, scar on the face, or other evidence of a personal injury. It should show date of entering and leaving service, in what capacity and at what point or on what division employed. The capacity in which the person has been employed, the general character of his work and the particular circumstances causing his retirement should be explicitly stated; and in order that the party to whom the service card is issued cannot afterward go back on the statement showing cause of dismissal, he should be required to sign it at the bottom in a space provided for that purpose, under the words, "I have read the above and freely certify to its correctness." This will not only serve as another means of proving the identity of the holder, but in cases where they have been discharged for

offenses such as drunkenness off duty, information concerning which comes to the superintendent through parties who could not prove it, but the correctness of which may be acknowledged by the discharged employee at the time, if the card bears his signature he becomes a party to the instrument, and if afterwards he feels that the company cannot prove that the statement is true, the only evidence he can produce will bear his own signature certifying to the correctness of the statement giving cause of dismissal. The duty of signing service cards should not be intrusted to clerks, but they should be carefully examined and signed personally by the issuing officer and bear his office stamp.

The Station Agent and his Customers.*

An agent is the railroad at the station over which he presides. The company he serves has transportation to sell. Acting for the railroad, you are merchants, sellers of transportation, both wholesale and retail. Looking through your stock ledger you find at your command a vast system of railroads reaching from the Atlantic on the East to the Mississippi on the West, and from the Potomac south to and through all the trade centers, connecting with closely allied lines over which you can reach the Gulf ports only a short distance beyond. . . . Your export facilities need no comment. What is the condition of your stock? Your road-bed is good—excellent. Heavy rails, stone and rock ballast, smooth track, equipment first-class, motive power second to none. Elegant passenger service, fast schedules, sure connections, through cars. Regular and reliable freight schedules, quick time, safe and prompt deliveries, and last, capable and efficient transportation officers, who stand ready and willing to deliver promptly and safely all the goods you sell. Your ability to "keep shop," to handle your stock and to keep your books is recognized. Now, what is necessary on your part to increase your trade, to secure new customers? First, be masters of your profession. A thorough knowledge of your work in all of its details is essential. . . . Seek to draw customers by inspiring confidence in you and in your work. Draw the public to you by practical demonstrations of your ability to satisfactorily transact all matters intrusted to your care. Make a special effort to lift the veil of mystery behind which a large percentage of your patrons and the general public seem to think the workings of your establishment are conducted. Seek to dispel this fallacy. Stand out clear and distinct, open and aboveboard as a representative of an establishment dependent upon the patronage of the public for sustenance and support. Mingle with your people; be one of them; listen to their wants, and use your best efforts to satisfy them. Encourage their efforts to build up and to improve your cities. Keep in full and complete sympathy with the community. Keep the officials of your company fully advised of all matters pertaining to the wants and needs of your people. Bear in mind the percentage of profit on the penny loaf is as great as that on the car of grain. The little grocer around the corner is a consumer of your wares as well as the wholesale merchant. Keep in cordial relationship with all. Make of your agencies bureaus of information, and let it be your pleasure to impart facts, whether such facts pertain directly to your wares or to those of your competitor. Let the public understand that it is not your purpose to sell your goods by underrating those of your competitors. Be frank with shippers; tell them facts. Do not mislead them by promises beyond your power or the power of your company to fulfill.

Railroad companies are known as quasi-public corporations; but an agent, though a public officer, must not be arrogant. The public always resents such conduct, and the business of the company suffers. No messenger or under-clerk in an establishment of trade would make such a mistake, nor must you. Like a good merchant, you should so act as to never lose a customer under any competition, and be on the constant lookout to capture new friends. Remember, in your sphere you are the Southern Railway Company, and directly responsible for its revenues. The efficiency of every such officer is rated by the growing increase in the revenue reported from his station. . . . And, now, let me say by way of conclusion, that, being substitutes for the company itself, heavy responsibilities are on your shoulders, and it is largely in your power to make or mar the interests you so faithfully serve. In this era of progress there is no standstill in your profession; you must either go forward or you must retrograde.

TECHNICAL.

Manufacturing and Business.

The Hecart-Baltzey Hollow Axle Co. has been incorporated, with a capital of \$1,000,000, by William Heckart, William H. Wallace, George B. Hibbard, New York; John McIntyre, Jersey City, and Edwin Baltzey, Glen Echo, Md.

The Daimler Mfg. Co. of New York has been incorporated, with a capital of \$500,000, to make ma-

P. S. Noble, 1002 Chestnut street, St. Louis, Mo., wants a cheap standard gage locomotive with 16 or 17 in. x 25 in. cylinders. Give description, location and price.

The U. S. Engineer Office, 1428 Arch street, Philadelphia, is asking for proposals for furnishing and delivering at Government Wharf at Fort Delaware cement, broken stone, sand, steel I-beams, etc. Bids will be received until 12 o'clock noon Sept. 5. Information will be furnished on application to C. W. Raymond, Lieutenant-Colonel of Engineers.

The Walker Company has secured a duplicate of the order for twenty 500 H. P. generators, recently received from the Union Carbide Co. of Chicago. The order, as it stands, comprises over 20,000 H. P. in generators.

E. N. Hurley, after eight years of service as General Agent of the U. S. Metallic Packing Co., Philadelphia, Pa., has resigned that position to engage in other business.

The Edmond Electric Traction & Signal Co. of New York has been incorporated in West Virginia with a subscribed capital of \$500, with the privilege of increasing it to \$5,000,000. The Directors are D. N. Maxon, G. E. Cruse, C. S. Jones, E. A. Davies and R. H. E. Starr. The company is organized for the purpose of building, equipping and maintaining railways, signals, signal stations, and for furnishing electric heat, light and power.

The Alton (Ill.) Railway & Illuminating Co. intends to extend its road in the spring of 1899, which will necessitate buying a new generator for the power station.

Harry W. Frost, who has been General Sales Agent of the Monarch Brake Beam Co., with an office in the Old Colony Building, Chicago, has been made General Manager of that company, with headquarters at Detroit.

Iron and Steel.

The United States Consul at Birmingham, England, reports a firm of English merchants having an important continental trade as wanting quotations on American boiler and ship plates in 400-ton lots.

The entire plant of the Valentine Iron Co., at Bellefonte, Pa., has been advertised to be sold at sheriff sale Aug. 22.

It is stated that the Titusville Iron Co., Ltd., of Titusville, Pa., intends to build in the near future additions to the radiator works on East Spring street, increasing the capacity four times.

The employees of the American Steel & Wire Co. have struck on account of a reduction in wages.

Operations at the Pennsylvania Steel Works continue brisk, with over 6,000 employees on the rolls. No. 1 blast furnace is being repaired, and will be put in blast again in about six weeks. Additional hot ovens are being built at blast furnaces Nos. 3 and 4.

At the annual meeting of the stockholders of the Lackawanna Iron & Steel Co., Scranton, Pa., the following directors were elected: Edwin Hatfield, Samuel Sloan, William Dodge, DeWitt C. Blair, Moses Taylor Pyne, Walter Scranton, Henry Taylor, Mark A. Cox, New York, and William F. Hallstead of Scranton.

The Leechburg Foundry & Machine Co., with offices in the Lewis Block, Philadelphia, Pa., intends to move its plant from Leechburg to a point about half a mile west of Homestead. The buildings will be of brick and steel, as near fireproof as possible. One of the buildings is to be a power house for generating electricity for power and light. Electric power is to be used entirely throughout the works. At the new plant the company intends to make steel castings and steel and iron machine molded gear in addition to building rolling mill and tin plate machinery and rolls and ingot rolls. Work is expected to begin on the buildings about Sept. 1. Contracts for buildings and machinery have not yet been let.

New Stations and Shops.

The building for which the Beech Creek Railroad has broken ground at Jersey Shore, Pa., is to be simply a shed for track repairs of cars.

The brick work on the new shops of the Missouri, Kansas & Texas being built at Sedalia, Mo., has been completed.

It has been rumored that the Atchison, Topeka & Santa Fe will build locomotive works at Topeka, Kan. An official of the company has stated to us that no plans are being prepared for such buildings and that he does not think, according to the present prospects, that there will be any extensive addition to the shops now at that point.

Regarding the rumors of additions to be made to the shops of the Southern California at San Bernardino, we are advised by that company that they are not contemplating any extensive additions.

Plans have not yet been drawn for the new station which is to be built at Albany by the New York Central & Hudson River.

We are advised by the Pittsburgh & Western that the company has no intention at the present time of building a new depot at Allegheny.

It has been stated that the Chicago, Milwaukee & St. Paul has bought land at Madrid, Ia., for the purpose of building shops. We understand from the company that they have not purchased any land at Madrid, and that there is no foundation for the report concerning the building of car shops at that point.

The Florida, Central & Peninsular has placed a contract with W. A. Macduff to build a brick warehouse at Jacksonville, Fla.

The Chicago & Northwestern will build two new passenger stations on its Milwaukee Division. One of these will be at Ravenswood, and will cost approximately \$9,000; the other will be at Cuyler, and will cost about \$3,000. The stations will be arranged with special reference to the suburban traffic. Frost & Granger, Chicago, are the architects.

*Abstract of a paper by C. E. Carson, Superintendent of Terminals of the Missouri Pacific, Kansas City, Mo., read before the Central Association of Railroad Officers at Indianapolis, July 12, 1898.

*From a paper read by A. H. Plant, Auditor Southern Ry., before the Association of Southern Railway Agents, at Norfolk, Va., July 12.

Electricity on the London Underground.
A bill promoted by the Metropolitan (underground) Railway Co. of London, which has passed both Houses of Parliament, contains power to work their own line and the line of the Metropolitan District Railway by electricity. The directors of the Metropolitan have agreed with the directors of the Metropolitan District for an experimental working by electricity of a piece of line between Kensington, High street, and Earl's Court Stations (0.76 mile), at an estimated cost of \$100,000.

New Elevator for Chicago.

The Chicago, Burlington & Quincy claims that it will rebuild at Chicago the elevator which was burned some time ago, provided the river is so improved that large boats can come alongside and turn nearby. The river interests want the river improved near the location of this elevator and the Sanitary District also wants it widened in order to get more water for the drainage canal. To make the necessary changes the Chicago & Northern Pacific swing bridge near Taylor street will have to be rebuilt. Each of the several interests wants the others to bear the expense of the changes and a settlement has not yet been reached.

Steel Platforms.

We are informed that the Standard steel platform made by the Standard Coupler Co. is now in use on 43 railroads in the United States and Canada. This result has been brought about within the last 16 months.

The Lewiston and Queenston Suspension Bridge.
The old suspension bridge at Lewiston, about six miles below Niagara Falls, which was built in 1850, and which was wrecked by the wind April 16, in 1864, is at last to be rebuilt. A few weeks ago the cables, which have swung for 34 years, were removed and the new bridge will be built with the cables taken from the Niagara Falls and Clifton suspension bridge, which has been replaced by Mr. Buck's 840-ft. arch. The Lewiston bridge will be built by a company called the Lewiston Connecting & Queenston Heights Bridge Co. Mr. Richard S. Buck, Resident Engineer under Mr. L. L. Buck during the building of the great railroad arch and the 840-ft. arch at Niagara, is Chief Engineer of the Lewiston bridge.

Gas on the New York Central.

The New York Central & Hudson River Railroad Co. has contracted with the Safety Car Heating & Lighting Co. for Pintsch gas equipment for 250 coaches. The company now has 557 coaches so equipped. When we consider that the New York Central has made considerable experimental investigation of electric lighting, both from the axle and from a dynamo in the baggage car, this increase of 50 per cent. in its Pintsch equipment is suggestive.

THE SCRAP HEAP.

Notes.

On the Union Pacific three freight crews are now running through between Cheyenne and Rawlins, 194 miles.

The Pullman Company is now running 180 cars in New England, of which number about 100 are on the Boston & Maine.

At Atlantic City, N. J., last week Stephen Murray, lately released from jail, where he had served a sentence for ticket scalping, was again arrested for the same crime.

The city of Cincinnati has passed a stringent ordinance regulating the business of ticket brokerage. Each broker must give a bond of \$1,000, which must be approved by the Corporation Counsel and by the Board of Legislation.

The Nashville, Chattanooga & St. Louis has restored one-half of the reduction which was made on the wages of employees in 1893. The reduction on salaries less than \$300 a month was 10 per cent., and on those above that sum it was 20 per cent.

The inspectors of the grade crossing department of the New York State Railroad Commission are making tours of the three principal railroads of the state gathering detailed information concerning the conditions at each highway grade crossing on the line.

The Atchison, Topeka & Santa Fe has begun a suit for an injunction against the Western Union Telegraph Co. to compel it to furnish the revenue stamp for telegrams sent by the road. The Atchison has a contract with the Western Union under which messages to and from points off the Atchison lines are paid for, under certain conditions.

The Chicago, Milwaukee & St. Paul has put library buffet cars on the fast trains between Chicago and Omaha. Express trains on the Omaha line of this road are now made up with the day cars at the rear, the order of the cars from the engine being as follows: Mail car, baggage car, buffet library car, sleeper, dining car, smoking car and two coaches.

A gang of 16 workmen has begun dismantling the 32 sleeping cars which have stood on a side track of the Pennsylvania Railroad near Newry, Pa., for the last 20 years. These cars, though in an advanced state of dilapidation and decay, have been constantly watched all these years. They are a part of the

property which was the subject of the long pending litigation between the Pullman Company and the Central Transportation Co., familiar to our readers. This litigation has now been settled.

Grade Crossings at Fall River.

The City Engineer of Fall River, Mass., has completed a plan for the abolition of a number of grade crossings in that city and it is now under consideration by the officers of the New York, New Haven & Hartford. The total estimated cost of the changes contemplated is about \$1,000,000.

The Traffic at the Soo.

The following is the official report of freight and passenger traffic to and from Lake Superior for the month of July, 1898, including statistics of the United States and Canadian Canals at Sault Ste. Marie, Michigan and Ontario:

EAST BOUND.			
Items.	Designation.	U. S. Canal.	Canadian.
Copper.....	Net tons.	16,092	610
Grain.....	Bushels	1,291,100	267,464
Building Stone.....	Net tons.	462	462
Flour.....	Barrels	469,805	87,720
Iron Ore.....	Net tons.	1,834,136	221,438
Iron, Plg.....	Net tons.	6,446	6,446
Lumber.....	M. ft. B. M.	139,722	235
Silver Ore.....	Net tons.	.....	.....
Wheat.....	Bushels	1,667,215	601,052
Unclassed freight.....	Net tons.	27,252	6,035
Passengers.....	Number.	3,397	2,338
			Total, 5,735

WEST BOUND.			
Items.	Designation.	U. S. Canal.	Canadian.
Coal (hard).....	Net tons.	54,876	10,003
Coal (soft).....	Net tons.	494,604	84,636
Flour.....	Barrels	200	200
Grain.....	Bushels	565	565
Manufactured iron.....	Net tons.	46,458	46,458
Salt.....	Barrels	25,410	3,814
Unclassed freight.....	Net tons.	41,502	3,143
Passengers.....	Number.	4,528	2,123
East bound freight, net tons.....			2,491,019
West bound freight, net tons.....			755,768
Total freight, net tons.....			3,246,787
Total craft—United States.....		2,025	
Total craft—Canadian.....		559	2,584
Total registered tonnage—United States.....		2,331,062	
Total registered tonnage—Canadian.....		314,043	2,645,105

River and Harbor Work in the Hudson and About New York.

From press abstracts of the annual reports of Adams and Major Miller, U. S. A., we glean a few notes.

That portion of the Hudson now under improvement by the United States extends from the State dam at Troy down stream to Coxsackie. The object is to provide a 12-ft. channel, 300 ft. wide, from the State dam to Broadway, Troy, and 400 ft. wide from Broadway, Troy, to Coxsackie. Below the latter point there are ample depth and width. Of this improvement, all of the \$2,447,906.56 estimated cost in the River and Harbor Act of 1892 has been appropriated, except \$160,406.56, which is provided for in the Sundry Civil Act for 1899. The number of passengers carried on the river in 1897 was 612,000. In round numbers, the registered tonnage of all vessels is above 52,000.

When dredging on Elizabeth River was suspended a channel 7 ft. deep and 30 to 60 ft. wide had been secured from the mouth to Bridge street, Elizabeth. It has probably deteriorated.

The work done on the Raritan River increased the channel width from 60 to 100 ft. for 400 ft.; for an additional distance of 200 ft. a width of 100 ft. was made, and for a further distance of 100 ft. a width of 50 ft. was made.

The East Chester project in 1897 was nearly completed; there remained only the widening of the channel between Town Dock and Lockwood's by dredging and removing a small amount of rock. The channel has been made 90 ft. wide at mean high water, and about 100 ft. wide from Pelham Bridge to a point 3,000 ft. above Lockwood's.

The operations on the Bronx, consisting of rock excavation and removal, resulted in removing 1,250 cu. yds., and were completed Sept. 22, 1897. Three ledges have been removed, making a depth of 6 ft. at mean low water. Above the railroad bridge, where no work has been done, the channel depth is from zero to 2½ ft.

At Port Jefferson Harbor the work done was removing 28,420 cu. yds. of sand and stones; the channel of 12 ft. depth at mean low water was widened 60 ft., making its width 160 ft., and on the inner half of the bar an additional cut of 20 ft. width was made.

The jetty work at Patchogue River, Long Island, had been completed at the beginning of the year, and the dredging nearly so. The dredging was completed Aug. 10, 1897. The jetty has been made 1,700 ft.; the channel has been dredged 60 ft. wide and 6 ft. deep at mean low water from Great South Bay to 80 ft. from the harbor lines.

At Harlem River and Spuyten Duyvil the total amount dredged under the contract with R. R. Moore was 712,790 cu. yds. From the Hudson River to Macomb's Dam Bridge the improved channel is now 12 ft. deep and over at mean low water, and from 180 to 300 ft. wide; the depth is 18 ft. through the rock cut, and the width 350 ft. From Macomb's Dam south to Ward's Island the available channel is 15 ft. deep and over, and nowhere less than 150 ft. wide. To complete the project there remain the widening of the channel to the full width of 350 to 400 ft., deepening it to 15 ft. and revetting the banks, where the channel excavation passes through meadow or upland.

In New York Harbor, the operations for the year consisted of removing shoals, widening the channel and resurveying the harbor. The improved channel for deep water below the Narrows to deep water beyond the bar has a depth of 30 ft. at mean low water, and a general width of 1,000 ft. throughout.

At Northwest Shoal the 30-ft. channel has been widened to 1,700 ft.

At Gowanus Bay 1,499,462 cu. yds. of material have been dredged. Bay Ridge Channel has been dredged 800 ft. wide and 26 ft. deep at mean low water throughout its length; also the triangular area between Bay Ridge and Red Hook channels. Red Hook Channel was dredged 26 ft. deep, with widths of 400 ft. or less where work is now in progress. These channels have shoaled in places from 1 to 2 ft.

In East River and Hell Gate 31 tons of rock were removed in the year. The depth over the reef was 17.8 ft. The projected depth is 18 ft.

State Railroad Taxes in Indiana.

The Indiana State Board of Tax Commissioners has completed its review of the assessments of railroad

property for 1898. The total valuation is \$154,912,000, an increase of \$39,000 over 1897.

South American Notes.

By the present arrangement of the Cartagena-Magdalena Railroad with the Compania Fluvial de Cartagena and other Magdalena steamboat lines, connection is made at Calamar for up-river points on the 5th, 12th, 18th, 24th and 30th of each month. The schedule time for boats between Calamar and La Dorado (for Honda) is six days up and three days down.

The receipts of the Paulista (Brazilian) Railroad for 1897 amounted to 22,223,833 mil reis (exchange rate now 7½, which is below the average for 1897), with expenses reaching 14,752,190 mil reis. Out of the net revenue 6,000,000 mil reis were paid in dividends, and 1,471,643 were carried forward as "suspended profit" and reserve. The dividends were at the rate of 10 per cent. on the capital stock. The length of line in operation is 507 miles.

A proposition has been made to the Bolivian Government by an engineer named Frost on behalf of foreign associates for the construction of a railroad from the Rio Paraguay at a point near Puerto Suarez to the Bolivian city of Santa Cruz. Subsidy in the form of land grants only is asked. A more probable railroad connection from Bolivia to eastern navigable water is that with the Argentine Central Northern, which project is being strenuously advocated by Señor Valdivieso, Bolivian Minister of Public Works.

The Mogyaua Railroad, of the State of São Paulo, Brazil, will soon be in competition with the São Paulo Railroad from Santos to the interior, in spite of the long and persistent efforts of that monopoly to control the route against all rivals. The directors of the Mogyaua have accepted the offer of a syndicate of contractors to build the line into Santos, the contractors furnishing the capital until the line is ready for operation. From this it would seem that the legal obstacles against a competing line, which existed under the old São Paulo concession, had been overcome.

The Department of Public Works at Buenos Ayres has accepted the proposal made by Sr. Garcia Leguizamon for an extensive electric street car system in that city. The work of construction is to begin within six months, and the first section is to be completed within a year thereafter. The second is to be finished in two years. The system is to be operated by overhead trolley wires. The fare is to be ten centavos, a little less than five cents, for each section, the company to pay to the municipality 6 per cent. of the gross earnings. The line is to revert to the municipality after 60 years.

Work on the Argentine Northeastern Railroad is progressing, and will be so far completed within another year that the development of this almost virgin territory may be commenced on a substantial basis. The line starts from Monte Caseros, about 350 miles up the Paraguay from Buenos Ayres, and will connect the cities of Monte Caseros, Mercedes, Saladas, Empedrado and Corrientes. Empedrado will be the port of the western branch of the road. The region traversed being intersected by several large rivers, there will be a number of important bridges. Temporary bridges have been thrown across the rivers Corrientes, Batel and Santa Lucia, for use both in traffic and in the construction of the permanent bridges. That over the Corrientes will be 6,567 feet long; that over the Batel, 1,150 feet, and the one over the Santa Lucia, 1,500 feet. On the eastern branch, from Libres to Santo Tomé, on the Rio Uruguay, the Rio Aguapey is encountered, which will be spanned by a bridge 5,345 feet in length. This is regarded as the most formidable engineering work on the entire system. In the cases of the three former bridges the girders are carried on screw piles 19½ inches in diameter, except for the central spans over the river channels, where cylinders are used.

A Railroad in Haiti.

Plans are being perfected for the construction of a line of narrow gage railroad from Cape Haitien to La Grande-Rivière du Nord, a point situated about 18 miles to the northeast. The capital stock is \$450,000, and the estimated cost \$250,000. The material, the contract for which has not yet been awarded, is to be purchased wholly in the United States. Mr. H. Thomasseh, the engineer who is to direct the work, and who also constructed the tramway at Port au Prince, testifies to the superior workmanship and durability of material obtained from the United States.

The Government grants to Messrs. Cincinnatus Leconte and Bianc Eusebe, the former at present Minister of the Interior and Public Works, the exclusive privilege of constructing the road in question, the concession to last for a period of sixty years, and guarantees 8%. All articles and material necessary for the work are to be admitted free of duty. The Government grants to the concessionaries, for a period of thirty years, the tolls of an iron bridge, which is to be the terminus of the road at Cape Haitien and also the public lands in the districts of Capt Haitien and Grande-Revière along the route.

Railroad Supplies for China.

Consul-General Goodnow writes from Shanghai, under date of June 18, 1898: Eight mogul freight engines have just arrived and are being erected at Tongku for the Northern Railways of China, and Chief Engineer Kinder has to-day ordered four lighter engines for switching purposes. All these are from the Rogers Locomotive Company, of Paterson, N. J.

I inclose report of tenders just received for 7,000 tons steel rails and accessories, all to be delivered at Tongku.

Name of bidder.	Rails.	Plates.	Bolts.	Spikes.
Per ton.	Per ton.	Per ton.	Per ton.	Per ton.
Jardine, Matheson & Co....	\$31.37	\$39.10	\$78.89	\$75.03
William Forbes & Co.	31.68	40.06	65.87	59.42
George Turner	31.68	33.76	76.72	73.26
Louis Spitzel & Co.	32.17	45.34	57.32	57.32
Birch & Co.	32.26	40.60	76.13	72.91
William Forbes & Co.	32.70	41.10	66.90	60.45
Vander Stegen & Co.	32.57	45.34	59.65	55.56
Carlowlitz & Co.	32.46	41.58	78.90	75.63
William Forbes & Co.	33.54	41.93	81.30	77.42
Buchelster & Co.	33.66	42.24	80.52	77.22
Mitsui Bussan Kaisha	33.69	41.84	79.12	75.40
Tientsin Trading Company..	34.24	42.64	79.96	76.46
Mandi & Co.	33.11	49.76	71.57	68.17
A. S. Forbes & Co.	29.20	43.80	66.70	58.40

*Materials from different makers.

Under date of May 14, Consul-General Goodnow says that the bid of A. S. Fobes & Co. had been accepted.

Railroad Advertising Extraordinary.

The Baltimore News reports that the Baltimore & Ohio Railroad has on a high board fence in that city a "life size" picture of a locomotive, advancing toward the observer, which is so natural that a spirited horse, being driven along the street the other day by a dignified citizen of Baltimore, became frightened at the engine (the picture) and ran away. As the able and enterprising Press Agent of the Baltimore & Ohio seems to have been temporarily overcome with modesty and to have neglected sending out this item of news we hasten to give it to the world. According to the account in the News, General Passenger Agent Martin has built board fences around 20 vacant lots owned by the road in different parts of Baltimore, and has had them all covered with advertisements of the road. One of these boards is 12 ft. x 80 ft., another is 6 ft. x 350 ft., with lettering so large that there is room for only six words on the whole fence. Opposite the Mount Royal Station is a bulletin board 14 ft. x 50 ft., with a painting of a complete Royal Blue train. The other half-dozen bulletins vary from 30 ft. to 163 ft. in length.

A Proposed Mountain Railroad in Massachusetts.

Mr. Jewett, of South Deerfield, Mass., proprietor of the hotel on Sugar Loaf Mountain, has engaged C. J. Day of Greenfield to survey a line for a railroad to the top of the mountain. It is expected that the line will be about 1,000 ft. long.

Railroad Taxes in Montana.

The valuation of the railroads of Montana for taxation has been completed for the year 1898. The total is \$13,793,273, an increase of \$119,220 over last year.

Heaviest Train on Record.

A press dispatch from Altoona, Pa., Aug. 9, reports the running of what is doubtless the heaviest train ever moved a long distance by a single locomotive. It was drawn from Altoona to Columbia, over the Pennsylvania Railroad, by Class H5 Engine No. 872, the first of that class built. The train was made up of 130 cars of coal, which made a train 3,877 ft. in length, a trifle less than three-quarters of a mile. The total weight of the train behind the tender was 5,212 tons, of which 3,693 tons was the weight of the coal. It left Altoona at 9 a. m., arrived at Harrisburg, 132 miles, at 9 p. m., and Columbia at 11 p. m. Two crews were required to handle the train over the Middle Division. This locomotive was described in the Railroad Gazette of June 10 and July 29. It weighs 104 tons.

LOCOMOTIVE BUILDING.

The Rogers Locomotive Co. is building two engines for the Galveston, Houston & Henderson.

The Carnegie Steel Co., Ltd., is having two 10-wheel engines built by the Baldwin Locomotive Works.

The Baldwin Locomotive Works are building one engine for the Vicksburg, Shreveport & Pacific (Queen & Crescent Route). This is in addition to the one referred to June 3.

Consul Halstead writes to the State Department from Birmingham, England, July 8, calling attention to an item in the Birmingham Daily Post to the effect that information had been received from an influential quarter that very considerable contracts are to be given out by the Japanese Government for locomotives and rolling stock before the end of the year. It was expected that this would be the case, but it now looks doubtful, owing to the unsettled state of politics in Japan. Until a new ministry is formed no money can be had by the Imperial Government systems for the new rolling stock they undoubtedly need.

In our issue of July 15 we noted the fact that the San Francisco & San Joaquin Valley was having two locomotives built by the Baldwin Locomotive Works. These will weigh 104,000 lbs., with 66,000 lbs. on the drivers, and have 18x24 in. cylinders; 60 in. driving wheels; wagon top type boilers, with a working steam pressure of 160 lbs.; fireboxes, length, 78 $\frac{1}{2}$ in., width, 34 $\frac{1}{2}$ in.; tank capacity, for water, 3,000 gals. The engines will be furnished with Westinghouse brakes, National hollow brake beams, Janney couplers, Buck headlights, Monitor injectors, U. S. metallic piston and valve rod packings, Nathan lubricators, crucible cast steel springs, cast steel tires and cast iron wheel centers.

CAR BUILDING.

The Centralia & Chester is having 60 cars built by the St. Charles Car Co.

It is reported that the Rio Grande Western will build some freight cars at its own shops.

The Union Pacific has recently given an order to the Weil & French Co. for 300 freight cars.

The Barney & Smith Car Co. is building seven cars for passenger service for the Georgia Southern & Florida.

The Ohio Falls Car Mfg. Co. is building 200 freight cars for the Nashville, Chattanooga & St. Louis. These are in addition to the 200 referred to in our issue of April 1.

The 48 coal cars of 80,000 lbs. capacity which the Terre Haute & Indianapolis is building in its own shops, and referred to in our Aug. 5 issue, have wooden underframes and car bodies 33 ft. long, 9 ft. 2 $\frac{1}{4}$ in. wide and 44 in. high, inside measurements. These cars also have diamond frame trucks with pressed steel bolsters, National hollow brake beams, Westinghouse quick-action air brakes, Janney couplers, Graham draft rigging and Davis journal box lids.

Reports have appeared in various papers to the effect that the Chesapeake & Ohio had ordered a large number of cars and is about to order more. The total number of cars ordered this year by the Chesapeake & Ohio was 2,000 box and 500 coal cars from Pullman's Palace Car Co. and 500 coal cars from the Ensign Mfg. Co., which have been described in the Railroad Gazette. We are officially informed that the road does not expect to order additional cars this year.

In our issue of July 5 we noted the fact that the

Missouri Car & Foundry Co. was building 200 freight cars for the International & Great Northern. These are for Sept. 1 delivery, and the principal dimensions are: Length 34 ft., width 8 ft. 4 in., height 7 ft. 2 in. The cars will be of 60,000 lbs. capacity, weigh 35,000 lbs., and be equipped with American steel bolsters, National hollow brakebeams, cast iron brake shoes, Westinghouse brakes, Phosphor-Bronze brasses, Missouri Pacific steel couplers, St. Louis flush car doors and fastenings, Continuous draft rigging, malleable iron journal boxes with M. C. B. lids, Flatau roofs, Pickering springs, American steel trucks and cast iron wheels.

The North Chicago street railroad is in the market for 75 motor cars.

The North Chicago street railroad has placed an order for 25 open motor cars with the J. G. Brill Co., and for 50 closed motor cars with the John Stephenson Co.

BRIDGE BUILDING.

AUBURN, CAL.—The trustees of Auburn will build wagon bridge over the tracks of the Southern Pacific near Clipper Gap and Colfax road.

BANGOR, MICH.—An iron bridge will probably be built across Black River, to cost about \$2,000.

BIG RAPIDS, MICH.—The Grand Rapids & Indiana Railroad, it is stated, will build a new bridge at Upper Big Rapids, to cost about \$18,000.

CHICAGO, ILL.—The Sanitary District Trustees on Aug. 6 concurred in their action taken the day before, when, as the Engineering Committee, they voted to adopt the Scherzer design for an eight-track railroad bridge to span the Drainage Canal at Campbell avenue. (See article on page 577.)

Bids for several small swing bridges over the Drainage Canal were opened by the Sanitary District Trustees, Aug. 8. The lowest bidders were as follows:

Chicago & Calumet Terminal Bridge.	& Iron Co.	\$7,318
	Substructure—Heldmaier & Neu.	7,500
	Superstructure—C. L. Strobel.	12,620
Summit Bridge.	Substructure—McArthur & Bros. and Winston Bros.	18,577
Willow Springs Bridge.	Substructure—C. L. Strobel	14,990
Lemon Bridge.	Substructure—Sackley & Peterson.	5,386
Romeo Bridge.	Substructure—C. L. Strobel.	14,990
Girardville, PA.—A new bridge will be built at Girardville, between Connors and Rapp.	Substructure—C. L. Strobel.	4,351
JOHNSONBURG, PA.—H. Little & Sons, Engineers, Ridgeway, Pa., have prepared plans for one or two iron or steel bridges to be built by the Borough of Johnsonburg. Bids are asked for until Sept. 1.	Substructure—Heldmaier & Neu.	9,639
LANCASTER, PA.—Press reports state that a new bridge will probably be built over Peters' Creek at Dorsey's mill, to take the place of one recently destroyed by flood. Wm. W. Grist, County Clerk.	Substructure—McArthur & Bros. and Winston Bros.	5,753
GIRARDVILLE, PA.—A new bridge will be built at Girardville, between Connors and Rapp.	Kedzie Ave.	

HAWLEY, PA.—The town of Hawley will probably build a small foot bridge, opposite Nolon's knitting mill. J. E. Mandeville was ordered to report on the matter to the Town Council.

JOHNSONBURG, PA.—H. Little & Sons, Engineers, Ridgeway, Pa., have prepared plans for one or two iron or steel bridges to be built by the Borough of Johnsonburg. Bids are asked for until Sept. 1.

LANCASTER, PA.—Press reports state that a new bridge will probably be built over Peters' Creek at Dorsey's mill, to take the place of one recently destroyed by flood. Wm. W. Grist, County Clerk.

LEWISTON, N. Y.—An international company, the Lewiston Connecting & Queenston Heights Bridge Co., will build a suspension bridge over the Niagara River between Lewiston, N. Y., and Queenston, Ont. Mr. Richard S. Buck, Resident Engineer of the Niagara Falls & Clifton Bridge, Niagara Falls, N. Y., will be Chief Engineer of this bridge.

LOS ANGELES, CAL.—A viaduct will be built over the Southern Pacific tracks, on the line of Ocean avenue, from designs by C. Leonardt. The structure will be 100 ft. wide and 189 ft. long; it will have one main span of 80 ft., and two side spans each 38 ft.

LOWELL, MASS.—A bridge will be built over the railroad tracks on the line of Lundberg street extension.

MARION, O.—Bids are wanted Aug. 13 by the Commissioners of Marion County for an iron bridge over Whitestone Creek, to have a span of 130 ft.; roadway 16 ft. U. K. Gutherey, County Auditor.

NASHVILLE, TENN.—A new bridge will probably be built at Nashville to cost about \$70,000.

NEW HAVEN, CONN.—Proposals will be received at the office of the City Engineer until Aug. 17 for building the substructure of the new Chapel street drawbridge over Mill River. C. W. Kelly, City Engineer. (July 22, p. 537.)

NEWPORT NEWS, VA.—It is stated that the City Engineer, Geo. Y. Alsop, has prepared plans for two steel bridges, to be built at 24th and 25th streets, each to be about 550 ft. long.

ORVILLE, CAL.—The Board of Supervisors of Butte County ask for bids until Sept. 7 for building a bridge over Powell Creek, near Enterprise.

OSHKOSH, WIS.—Proposals will be received by the Board of Public Works until Aug. 16 for building a steel bridge across Sawyer Creek. Oscar Sanne, Consulting Engineer, Colby & Abbott Building, Milwaukee, Wis.

PENDLETON, ORE.—Bids will be received until Sept. 7 for building two wagon bridges. B. S. Borroughs, Clerk, Umatilla County.

QUEBEC, QUE.—It is stated that E. A. Hoare, engineer of the Quebec Bridge Company, will prepare specifications and call for bids for building the bridge over the St. Lawrence at once. The bridge, which is to be a cantilever, will be about 3,300 ft. long, 150 ft. above high water and will have a span of 1,600 ft.

SAN JOSE, CAL.—The Clerk of Santa Clara County has been instructed to advertise for bids, to be opened Sept. 6, for building a bridge over Stevens' Creek.

TORONTO, ONT.—P. Gibson & Sons, township engineers, have prepared plans for bridges over Black Creek, West York, and over the Don River.

TOWSON, MD.—Press reports state that in the tenth district of Baltimore County 18 bridges and culverts were damaged by the recent floods, and

six will have to be entirely rebuilt. B. H. Mays, Superintendent of Bridges. M. F. Connor, County Clerk.

TWO RIVERS, WIS.—Press reports state that the Chicago & Northwestern will build a bridge over West Twin River, on the line of a spur track to be built to the works of the Two Rivers Manufacturing Co.

WATERLOO, ONT.—The Waterloo Township Council will expend \$9,000 in building bridges in the township.

RAILROAD LAW.—RECENT DECISIONS.

[The cases noted in the first five paragraphs are all decided by the Supreme Court of the United States.]

The decree entered to enforce the "Nebraska Maximum Freight Rate Decision" enjoins railroad companies in the state of Nebraska from reducing their rates for the transportation of freight to those prescribed by the act thereby declared unconstitutional, "or below those now charged by said companies or either of them or their receivers," and from obeying any of the provisions of such alleged act. The State Board of Transportation is also enjoined from in any manner recognizing the validity of the act, "and particularly from reducing its present rates of charges for transportation of freight to those prescribed in said act." This decree has been modified by striking out the words quoted. The Court says, in the course of its opinion, "We did not intend, by an affirmation of the several decrees, to adjudicate that the railroad companies should not, at any time in the future, if they saw proper, reduce the rates, or any of them, under which they were conducting business at the time the final decrees were rendered, nor that the State Board of Transportation should not reduce rates on specific or particular articles below the rates which the companies were charging on such articles at the time the decrees were entered. It may well be that on some particular article the railroad companies may deem it wise to make a reduction of the rate, and it may be that the public interests will justify the State Board of Transportation in ordering such reduction. We only adjudged that the enforcement of the schedules of rates established by the state statute, looking at such rates as a whole, would deprive the railroad companies of the compensation they were legally entitled to receive. . . . Of course, the reasonableness of a schedule of rates must be determined by the facts as they exist when it is sought to put such rates into operation." (Decided May, 1898.)²

A contract between a drover accompanying live stock and a railroad company provided that the drover should remain in the caboose while the train was in motion, and that failure to do so should be at his own risk of personal injury from any cause whatever. In violation of this contract he rode in the same car with the stock throughout the whole trip. While so riding the train was stalled on a steep grade. It was uncoupled and part was taken up the grade, leaving the rest stationary. The engine in returning struck the car in which he was with such force that he was hurt. The Court holds that he was not chargeable with such negligence as would defeat a recovery for this injury by reason of his violation of the contract, since at the time of the accident the car was stationary; and that he had a right to be in the car at any time when it was not in motion, in the absence of an expressed stipulation limiting such right to stops at regular stations. (Decided May, 1898, one justice dissenting.)³

The Common Council of Detroit passed an ordinance whereby they attempted to grant exclusive authority to a corporation to operate street railroads in certain specified streets of that city and through such other streets as should from time to time be fixed upon, if the corporation should express its assent in writing within 30 days after the passage of the resolution ordering the establishment of such new routes. Subsequently, and before the expiration of the period to which this grant was limited, the Common Council granted to another company the right to construct and operate railroads upon portions of certain streets on which the first mentioned company was operating its lines, and the same privilege as to certain other streets, without giving the first mentioned company an opportunity to decide whether it would construct the same. The first mentioned company attempted to enjoin the city and the other company from proceeding under authority of the latter ordinance, asserting a breach of the contract arising between the plaintiff and the city under the first mentioned ordinance. The Court holds that such an injunction could not be properly granted, since there is no power in a municipality to grant an exclusive franchise—in the absence of authority from the state, and that no such authority existed in this case, nor could it be implied from an act of the Legislature which provided that no company should be authorized to construct a street railroad without the consent of the municipal authorities under such regulations and conditions as they should prescribe. (Decided May, 1898.)⁴

An employee in Texas recovered a verdict from the railroad company employing him, for an injury sustained while uncoupling cars which were out of order. On the trial it appeared that the defective cars had been delivered to the defendant to be loaded at a mill, on a spur of the defendant's main track leading from its yard, and redelivered to the other company to be carried to their destination over its own line. It further appeared that these cars had not been inspected by the defendant, in conformity with its custom not to inspect foreign cars which were not intended to be sent over its own road. The Court sustains the verdict on the ground that the duty which rests upon a railroad company to use proper care to see that its cars are in good condition applies to all cars which its employees are required to handle, and is not limited, even in the case of foreign cars, to those received to be hauled over its road. The Court further holds that the plaintiff's right to recover would be the same even if he knew that it was the custom of the defendant not to inspect such cars as those in question. (Decided May, 1898, one justice dissenting.)⁵

In 1870 the Central Transportation Company, for an agreed annual rental, leased to the Pullman Company its entire plant, together with all its patents and all its contracts with railroad companies for the use of its sleeping cars. This lease was to run for 99 years, which was the duration of the charter of the Central Company. The Pullman Company paid the stipulated rent for several years, but finally refused to do so longer, and, in an action brought by

the Central Company to recover an installment of such rent, defended on the plea that the lease was invalid and not binding upon it, the making thereof having been beyond the lessors' powers as defined in its charter. This contention was finally supported by the United States Supreme Court, which in 1891 held the lease to be invalid.⁹ The present suit was brought by the Pullman Company to restrain the bringing of more actions for rent and to have the amount of compensation to be paid the Central Company for the property transferred fixed, its actual return being impossible. This amount was fixed by the referee appointed in the lower court for that purpose, at the market value of the Central Company's stock at the time the lease was executed. This method of computation is held on appeal to have been erroneous, and that the Pullman Company was liable only for the actual value of the tangible property transferred, the contracts and patents having expired and the rent agreed upon in the lease having been paid up to the time of such expiration. (Decided May, 1898, two justices dissenting).¹⁰ This decision cuts down the award to the Central Company from more than two and a half millions to less than three-quarters of a million dollars. The full opinion by Mr. Justice Peckham will be found interesting, discussing, as it does, other points in the case which it is inconvenient to include here.

In Connecticut an icehouse and its contents were destroyed by fire started from a locomotive. In an action to recover damages for the loss it is held that the plaintiff was entitled to be paid for all the ice destroyed, at its market value on the day of the fire, disregarding the fact that some of the ice might or would have been wasted from other causes. (Decided by the Supreme Court, June, 1898).¹¹ This seems to be the point decided, though the opinion is not altogether clear or altogether convincing. In the course of it the Court says: "The defendant having destroyed the plaintiff's property on a certain day, cannot justly be exempted from payment by alleging or even showing that, if it had not destroyed the property the plaintiff subsequently would have lost it in some other way."

It is held in New Jersey that a railroad company which maintains a turntable upon its own land is not liable for an injury to a child who comes upon the land uninvited and is hurt by playing with the turntable, and an invitation will not be implied from the fact that the turntable furnishes a place for play which is attractive to children. (Decided by the Supreme Court, June, 1898, one judge dissenting).¹²

The case of a child injured while playing on a turntable has frequently arisen in other jurisdictions. The United States Supreme Court has taken a position in such a case directly opposite to the decision here noted,¹³ and the doctrine laid down by it has been followed in many of the Western states. Its decision has, however, as here, been disapproved in other states in strong, well-reasoned opinions, notably in Massachusetts¹⁴ and in New York¹⁵. In the New York case referred to the opinion is written by Justice Peckham, now of the United States Supreme Court.

In the same state it is held that the fact that a child so young that it cannot be guilty of contributory negligence is allowed to go unattended in the public street does not relieve a street railroad company from liability for negligence in the management of its car, resulting in the child's death. The negligence of those having the child in charge is not imputable to it. (Decided in the Court of Appeals, June, 1898).¹⁶

1. Smyth et al. vs. Ames et al., 169 U. S. 466.
2. Smyth et al. vs. Ames et al., 18 Sup. Ct. 888.
3. T. & P. vs. Reeder, 18 Sup. Ct. 705.
4. Detroit C. R. vs. Detroit Ry., 18 Sup. Ct. 732.
5. T. & P. vs. Archibald, 18 Sup. Ct. 777.
6. Cent. Transp. Co. vs. Pullman Co., 139 U. S. 24.
7. Pullman Co. vs. Cent. Transp. Co., 18 Sup. Ct. 808.
8. Hubbard vs. N. Y., N. H. & H., 40 Atl. 533.
9. Turcotte vs. N. Y. S. & W., 40 Atl. 614.
10. R. R. Co. vs. Stout, 17 Wall. 657.
11. Daniels vs. R. R. Co., 154 Mass. 319.
12. Walsh vs. Fitchburg, 145 N. Y. 301.
13. Bergen Co. T. Co. vs. Heitman's Adm'r, 40 Atl. 651.

MEETINGS AND ANNOUNCEMENTS.

Dividends.

Boston & Albany.—Quarterly, 2 per cent., payable Sept. 3.
Canadian Pacific.—Common and preferred, semi-annual, 2 per cent., payable Oct. 1.
Chicago & Alton.—Common and preferred, quarterly, 1½ per cent., payable Sept. 1.
Cleveland & Pittsburgh.—Guaranteed, quarterly, 1½ per cent., payable Sept. 1.
Norfolk & Western.—Preferred, 2 per cent., payable Aug. 24.
St. Paul & Duluth.—Preferred, 4½ per cent., payable Sept. 1.
Third Ave. (N. Y.) RR.—Quarterly, 2 per cent., payable Aug. 31.

Technical Meetings.

Meetings and conventions of railroad associations and technical societies will be held as follows:
American Association for the Advancement of Science will meet in Boston Aug. 22 to 27 inclusive.
American Society of Civil Engineers.—Meets at the house of the society, 220 West Fifty-seventh street, New York, on the first and third Wednesdays in each month at 8 p. m.
American Street Railway Association will hold its annual meeting at Boston Sept. 6 to 9.
Association of Engineers of Virginia.—Holds its formal meetings on the third Wednesday of each month from September to May, inclusive, at 710 Terry Building, Roanoke, at 5 p. m.
Association of Railway Superintendents of Bridges and Buildings.—Eighth annual convention, Murphy's Hotel, Richmond, Va., from Oct. 18 to 20.
Boston Society of Civil Engineers.—Meets at 715 Tremont Temple, Boston, on the third Wednesday in each month at 7.30 p. m.
Canadian Society of Civil Engineers.—Meets at its rooms, 112 Mansfield street, Montreal, P. Q., every alternate Thursday at 8 p. m.
Central Railway Club.—Meets at the Hotel Iroquois, Buffalo, N. Y., on the second Friday of January, March, May, September and November, at 2 p. m.
Chicago Electrical Association.—Meets at Room 7,137, Monadnock Building, Chicago, on the first and third Fridays of each month at 8 p. m. J. R. Cravath, secretary.
Civil Engineers' Club of Cleveland.—Meets in the Case Library Building, Cleveland, O., on the second

Tuesday in each month at 8 p. m. Semi-monthly meetings are held on the fourth Tuesday of each month.

Civil Engineers' Society of St. Paul.—Meets on the first Monday of each month except June, July, August and September.

Denver Society of Civil Engineers.—Meets at 3 Jacobson Block, Denver, Col., on the second Tuesday of each month except during July and August.

Engineers' Club of Cincinnati.—Meets at the rooms of the Literary Club, 25 East Eighth street, on the third Thursday of each month, excepting July and August, at 7.30 p. m.

Engineers' Club of Columbus (O).—Meets at 12½ North High street on the first and third Saturdays from September to June.

Engineers' Club of Minneapolis, Minn., on the first Thursday in each month.

Engineers' Club of Philadelphia.—Meets at the house of the club, 1122 Girard street, Philadelphia, on the first and third Saturdays of each month at 8 p. m., except during July and August.

Engineers' Club of St. Louis.—Meets in the Missouri Historical Society Building, corner Sixteenth street and Lucas place, St. Louis, on the first and third Wednesdays in each month.

Engineers' Society of Western New York.—Holds regular meetings on the first Monday in each month, except in the months of July and August at the Buffalo Library Building.

Engineers' Society of Western Pennsylvania.—Meets at 410 Penn avenue, Pittsburg, Pa., on the third Tuesday in each month at 7.30 p. m.

Locomotive Foreman's Club.—Meets every second Tuesday in the clubroom of the Correspondence School of Locomotive Engineers and Firemen, 335 Dearborn street, Chicago.

Master Car and Locomotive Painters' Association.—Annual convention, Ryan Hotel, St. Paul, Minn., Sept. 13 to 16, both inclusive.

Montana Society of Civil Engineers.—Meets at Helena, Mont., on the third Saturday in each month at 7.30 p. m.

National Railroad Master Blacksmith Association.—Sixth annual convention, Boston, Sept. 6.

New England Railroad Club.—Meets at Pierce Hall, Copley Square, Boston, Mass., on the second Tuesday of each month.

New England Roadmasters' Association.—Sixteenth annual convention will be held at the Revere House, Boston, Aug. 17 and 18.

New York Railroad Club.—Meets at 12 West Thirty-first street, New York City, on the third Thursday in each month at 8 p. m., excepting June, July and August.

Northwest Railway Club.—Meets on the first Tuesday after the second Monday in each month at 8 p. m., the place of meeting alternating between the West Hotel, Minneapolis, and the Ryan Hotel, St. Paul.

Northwestern Track and Bridge Association.—Meets at the St. Paul Union Station on the Friday following the second Wednesday of March, June, September and December, at 2.30 p. m.

Roadmasters' Association of America.—Annual convention will be held at the St. James Hotel, Denver, Sept. 13, 14 and 15.

St. Louis Railway Club.—Holds its regular meeting on the second Friday of each month at 3 p. m.

Society for the Promotion of Engineering Education will hold its annual meeting at the Massachusetts Institute of Technology, Boston, Aug. 18 to 20.

Southern and Southwestern Railway Club.—Meets at the Kimball House, Atlanta, Ga., on the second Thursday in January, April, August and November.

Street Railway Accountants' Association of America will hold its second annual meeting in Boston Sept. 6 to 9.

Technical Society of the Pacific Coast.—Meets at its rooms in the Academy of Sciences Building, 819 Market street, San Francisco, Cal., on the first Friday in each month at 8 p. m.

Western Foundrymen's Association.—Meets in the Great Northern Hotel, Chicago, on the third Wednesday of each month. A. Sorge, Jr., 1533 Marquette Building, Chicago, is secretary.

Western Railway Club.—Meets in Chicago on the Third Tuesday of each month at 2 p. m.

Western Society of Engineers.—Meets in its rooms on the first Wednesday of each month at 8 p. m., to hear reports and for the reading and discussion of papers. The headquarters of the society are at 1736-1739 Monadnock Block, Chicago.

St. Louis Railway Club.

The July proceedings of the St. Louis Railway Club contain the discussion of a paper by Mr. C. W. Waughop, read at the April meeting, and entitled, "The Past, Present and Future of Car Inspection." The discussion seems to have been compiled by the Secretary, as evidently there was no regular meeting of the Club held in July.

One of Mr. W. M. Acworth's articles on "American Railways from an English Standpoint" is reprinted from the London Times. This article was published in the Railroad Gazette March 4, and the remaining ones of the series in the two succeeding issues, but too great publicity cannot be given to such an excellent study as Mr. Acworth has made.

Association of Railway Superintendents of Bridges and Buildings.

The Eighth Annual Convention of the Association of Railway Superintendents of Bridges and Buildings will be held at Murphy's Hotel, corner of Eighth and Broad streets, Richmond, Va., from Oct. 18 to 20, 1898.

Tuesday, Oct. 18, the Convention will be called to order by the President at 10 a. m. The President's address, and annual reports of standing committees will be presented. The succeeding sessions will be devoted to reports and discussions until Thursday afternoon, when excursions by trolley cars to the battlefield of Seven Pines and to other places of interest will take place.

For Friday Mr. Jos. M. Staten has arranged for a trip to Newport News, Old Point Comfort (Fortress Monroe), and a sail on Chesapeake Bay to Newport News Navy Yard and the Capes.

Through the courtesy of the Chesapeake & Ohio, members and their ladies will have free transportation from Richmond to Old Point Comfort and return, and also for the sail on the Bay to the Navy Yard and the Capes. Members will have ample time between the various sessions of the Convention to visit the many historic points of interest in Richmond.

All members of the Association are urged to attend

this meeting. The technical subjects to be discussed are important, and the committee assignments are such that excellent reports are confidently expected.

A list of subjects to be reported on follows:

1. Pile-rings and method of protecting pileheads in driving.

2. Cost and manner of putting in pipe culverts.

3. Best floors for shops and roundhouses.

4. Roundhouse smokejacks and ventilation.

5. Cattleguards and wingfences.

6. Prevention of fire in railroad buildings.

7. Storage of fuel, oil and other station supplies at way-stations.

8. Railroad highway crossing gates.

9. What repairs, and how can they be safely made, to metal and wooden spans without the use of falsework.

10. Care of iron bridges after erection, including best method of protecting them from injury by salt water drippings from refrigerator cars.

11. Turntable construction.

The essentials of the requirements for admission are contained in the following paragraph:

In the opinion of the Executive Committee, the following clause of the Constitution referring to the eligibility of an applicant for membership, namely "Any person at the head of a bridge and building department on any railroad, or a division or sub-division, and to include assistant superintendent and general foremen of any railroad, shall be eligible to membership," should, in accordance with the action of the Association in the past, be construed on the basis that the applicant must be in the employ of a railroad company, either as a superior officer with general control over questions affecting the bridge and building department, or as a subordinate official having actual responsible charge of work connected with the construction or maintenance of railroad bridges or buildings, independent of the actual title, whether as superintendent, supervisor, engineer, general foreman, general inspector, master of road, master carpenter, etc., but not to include persons only in sub-charge of individual jobs or special classes of work, such as gang-foremen, inspectors, clerks, draftsmen, etc.

PERSONAL.

Hon. Dexter Richards, projector of the Concord & Claremont, died at Newport, N. H., Aug. 7. He was 80 years of age.

Major Hugh Carlisle, who organized the Tennessee & Coosa Valley, died Aug. 8, in Marshall County, Ala. He was 70 years of age.

Mr. William A. Oliver, at one time Assistant Superintendent of the Chicago & Northwestern, died at Rochester, Pa., July 30. He was 65 years of age.

Mr. Melvin I. Corbett, Attorney for the Coal Department of the Delaware, Lackawanna & Western, died in Scranton, Pa., Aug. 9. He was 50 years of age.

Col. L. H. Smith, a Director of the Pennsylvania Trust Co. of Reading, Pa., and of the Wilmington & Northern Railroad, died at Johanna Furnace, Bucks Co., Pa., Aug. 6. He was 60 years of age.

Mr. F. G. Ewald has been appointed Consulting Engineer of the Illinois Railroad & Warehouse Commission. He fills the vacancy caused by the resignation of W. L. Tarbet. Mr. Ewald has been connected with the Engineering Department of the City of Chicago.

Mr. H. F. Houghton, who was recently appointed Superintendent of the Cleveland, Cincinnati, Chicago & St. Louis at Indianapolis, Ind., is a member of the staff of Governor Claude Matthews, with the rank of Colonel. Col. Houghton has been put in charge of the transportation of Indiana troops.

Mr. W. S. Scott, for several years Yard Master at Wall, Pa., on the Pennsylvania Railroad, has been appointed to a position in the Quartermaster's Department, United States Volunteers, with the rank of Captain, and has been assigned to duty with General Shafter at Santiago. Mr. Scott sailed from New York for his post of duty on Aug. 4 on the transport Breakwater.

Prof. R. B. Owens, of the University of the State of Nebraska, has been appointed Professor of Electrical Engineering in McGill University, Montreal. Mr. Owens is a Johns Hopkins man, and took a post-graduate degree as an Engineer from Columbia University in 1891. Since that time he has been connected with the University of Nebraska as Adjunct Professor and Professor of Electrical Engineering. He was one of the judges of electrical exhibits at the Columbian World's Fair.

Mr. Peter H. Wyckoff, General Freight Agent of the Central RR. of New Jersey, died at his home in Elizabeth, N. J., Aug. 9. The deceased had been connected with the C. of N. J. for about 40 years. He entered railroad service as a clerk in the Freight Department of that road, and rapidly rose to be its head. He was one of the most popular officials of the company. During his career Mr. Wyckoff was once General Traffic Manager of the Lehigh & Hudson River. He was 65 years of age.

Mr. Adolph Heinrich Joseph Sutro died in San Francisco Aug. 8. He was the originator and the successful promoter of the famous Sutro tunnel in the Comstock Lode in Nevada. He began his efforts to finance this great undertaking in 1860, but work was not actually begun until October, 1869, and the tunnel was completed, so far as it ever was completed, in 1879. It is said to have cost \$6,000,000, and is something like 21,000 ft. long, 8 ft. high and 10 ft. wide. It lies at great depth and consequently extraordinary temperatures were encountered during the construction, as was also some extremely bad ground. In 1878 the temperature of the rock at the heading was 100 deg. F. Mr. Sutro's plans for the tunnel were never carried out in their entirety, because the very deep mine workings were largely abandoned. But it is said that Mr. Sutro made a great fortune out of the enterprise. He was born in Aix-La-Chapelle, Prussia, in 1830, received a good industrial training, his father having been a manufacturer; went to California in 1850, was interested in gold mining and in reducing gold ores, and for the last 15 or 20 years has been a conspicuous figure in San Francisco, having once been Mayor.

ELECTIONS AND APPOINTMENTS.

Alabama Great Southern.—L. N. Kelso, who has been Solicing Agent in New Orleans of the lines composing the Queen & Crescent System, has been

transferred to Meridian, Miss., where he will hold the same position.

F. G. Lyons, formerly connected with the Kansas City, Pittsburgh & Gulf, has been appointed Soliciting Agent of the A. G. S. at New Orleans.

Ray Knight, formerly Assistant General Freight Agent of the East Tennessee, Virginia & Georgia, and recently Traffic Manager of the iron industries of Anniston, Ala., has been made Commercial Agent for the lines comprising the Q. & C. Route, with headquarters at Atlanta, Ga.

Atlantic Coast Line (S. C.).—Commencing Aug. 1, the A. C. L. of S. C. will become the successor by consolidation of the following companies: Wilmington, Columbia & Augusta, Northeastern of South Carolina, Cheraw & Darlington, Manchester & Augusta and Florence of South Carolina. The principal office of the company will be at Charleston, S. C. The officers are as follows: President, C. S. Gadsden, Charleston; Vice-President, H. Walters, Wilmington, N. C.; Secretary and Treasurer, C. C. Olney, Charleston; Assistant Treasurer, J. F. Post, Jr.; General Manager, J. R. Kenly; Traffic Manager, T. M. Emerson; General Auditor, W. A. Riach, all of Wilmington, N. C.

Baltimore & Ohio.—George B. Howarth has been appointed Auditor of Disbursements, vice Andrew F. Dunlevy, deceased.

Bristol.—At the annual meeting held in Rutland, Vt., Aug. 3, the following Directors were chosen: P. W. Clement, E. B. Patterson, W. N. Gove, H. J. Smith, W. P. Clement, R. Denio and C. L. Pierce. The Directors elected P. W. Clement President, and Ralph Denio Treasurer.

Central of New Jersey.—William L. Hoffecker has re-signed as Division Master Mechanic at Elizabethport, N. J.

Chicago, Burlington & Quincy.—H. T. Keenan has been appointed General Agent, with office at Fort Worth, Tex.

Cincinnati Northern.—James R. Davidson has been appointed Commercial Agent, with headquarters at Cincinnati. He was formerly Contracting Freight Agent at the same place.

H. T. Nicolay has been appointed Contracting Freight Agent, succeeding Mr. Davidson. Mr. Nicolay was formerly the Agent of the C. N. at Cincinnati.

Cleveland, Canton & Southern.—William A. Kappler has been appointed Auditor to Receiver J. W. Wardwell. He will have entire charge of the Accounting Department of the road, and all agents will report to him. His headquarters are at Cleveland, O.

John G. Stidger has been appointed Cashier, vice William A. Kappler, with headquarters at Cleveland.

Cornwall.—A. G. Machesney has been appointed Master Mechanic, with headquarters at Cornwall, Pa. He succeeds C. J. Herman.

Denver & Rio Grande.—F. B. Wiley has been appointed Traveling Freight Agent, with headquarters at Los Angeles, Cal.

Erie.—Willard Kelts of Cleveland has been appointed Master Mechanic of the shops at Huntington, Ind., to succeed John Hawthorne, resigned.

Frank E. Smith has been appointed Division Freight Agent of the Greenwood Lake Division, with office at Chambers St., New York.

Georgia & Alabama.—Bernard R. Guest, previously Assistant Treasurer, has been elected Treasurer, with office at Savannah, Ga., vice J. W. Brown.

Grand Rapids & Indiana.—H. C. Allen has been appointed Traveling Passenger Agent, with headquarters at Grand Rapids, Mich.

Great Northern.—The Breckenridge Division has been divided into two divisions. One division, still called the Breckenridge, begins at Benson, Minn., runs to Larimore, N. D., and takes in the Aberdeen Branch. J. M. Davis, heretofore Assistant Superintendent at Fergus Falls, has been appointed Superintendent of this division, with headquarters at Breckenridge, Minn. The other division, known as the Willmar Division, comprises the lines from the west limits of West Minneapolis Yard to the junction with the Benson & Watertown line, from Hutchinson Junction to Hutchinson, from Willmar Junction to Yankton, and from Benson Junction to Watertown, and from Watertown to Huron. R. H. Bowron, heretofore Superintendent of the Breckenridge Division, has been appointed Superintendent of the Willmar Division, with headquarters at Willmar, Minn.

Gulf, Colorado & Santa Fe.—James Wade has re-signed as Division Roadmaster at Alvin, Tex.

Illinois Central.—L. P. Morehouse, hitherto Tax Commissioner, will devote his time to the duties of his office of Custodian of Deeds.

W. L. Tarbet has been appointed Tax Commissioner, with headquarters in Chicago. Mr. Tarbet was heretofore Consulting Engineer for the Illinois Railroad and Warehouse Commission.

E. F. Stovall has been appointed General Agent of this road in Louisville, Ky.

Indiana, Illinois & Iowa.—F. C. Raff, formerly Superintendent in charge of transportation, has been appointed General Superintendent, with jurisdiction over the Transportation, Maintenance of Way, Structures and Motive Power departments.

R. P. Ahrens has been elected Secretary and Treasurer, vice S. A. Drake, resigned; and the office of Assistant Secretary and Treasurer was abolished.

Kansas City, Fort Scott & Memphis.—E. S. S. Smith, heretofore Private Secretary of Traffic Manager J. J. Fletcher, has been appointed Contracting Freight Agent at Kansas City, Mo.

Kansas City, Pittsburgh & Gulf.—Some of the general officers located at Shreveport, La., have been moved to Texarkana, Ark. W. E. Green has been appointed General Manager, with headquarters at Texarkana.

Lake Shore & Michigan Southern.—H. J. Rhein has been appointed City Passenger and Ticket Agent at Chicago, vice F. M. Byron, promoted.

C. S. Rogers has been appointed General Agent at Detroit, Mich., vice Mr. Rhein. Mr. Rogers was formerly District Passenger Agent at Grand Rapids.

Frank M. Byron has been appointed Assistant General Passenger Agent, succeeding C. K. Wilbur, deceased. For the past ten years he has been City Passenger Agent at Chicago.

Lehigh Valley.—The Maintenance of Way Force on the Pennsylvania & New York Division has been put in charge of B. A. Cunningham, Division Engineer, who will report to O. O. Esser, Superintendent. The office of Roadmaster has been abolished, and the office of Supervisor created in its stead. M. J. Greeney and W. M. Kennedy have been appointed Supervisors. They will report to Division Engineer Cunningham.

Litchfield, Carrollton & Western.—W. E. Crane, General Freight Agent of the Jacksonville & St. Louis, has been appointed General Freight Agent of the L. C. & W. He will assume the duties of both positions.

Louisiana & Northwest.—F. O. Emerson, who was recently appointed Master Mechanic of this road, was formerly connected with the Mexican Central in the capacity of General Foreman on the Tampico Division. (July 29, p. 555.)

Louisville & Nashville.—Robert A. Watson has been appointed Manager of the Coal Department, in addition to his duties as Cashier of that office.

Manistique & Northwestern.—M. H. Quick has been appointed Auditor, with headquarters at Manistique, Mich., vice T. L. Baxter, resigned.

Mexican Central.—B. J. Kunne has been appointed Commercial Agent, with headquarters at El Paso, Tex. Mr. Kunne succeeds Mr. G. M. Muller, assigned to other duties. (July 15, p. 521.)

Mobile & Ohio.—E. M. Cuttner has been appointed Advertising Agent, with headquarters at Mobile, Ala.

Nashville, Chattanooga & St. Louis.—H. F. Smith, heretofore General Freight Agent of the Southern Railway, with headquarters at Washington, has been appointed Traffic Manager of this road, with headquarters at Atlanta, Ga.

New Orleans & Northeastern.—R. J. Anderson has been appointed Assistant General Passenger Agent at New Orleans to succeed Willard Stoms, resigned.

New York & Ottawa.—The general offices have been removed from Morris, N. Y., to Ottawa, Ont. The officers are: President and General Manager, C. B. Hibbard; Secretary, Wade Chance; Treasurer, George H. Watson. The following appointments have been made, effective July 25: George B. Colpas, Auditor; George H. Watson, General Freight and Passenger Agent; Scott W. Derrick, Trainmaster and Chief Train Dispatcher; M. Keefe, Roadmaster; J. O. Hibbard, General Agent, all with headquarters at Ottawa, Ont. A. W. Flack, Traveling Agent, with office at Cornwall, Ont.; Charles Higgerty, Freight Soliciting Agent, and J. W. Boyd, Passenger Agent, both with headquarters at Ottawa, Ont.; F. D. Anthony, Chief Engineer, and C. E. Cartwright, Assistant Engineer with headquarters at Cornwall, Ont.

New York, Chicago & St. Louis.—The title of C. B. Hoyt, lately appointed General Roadmaster, has been changed to Chief Supervisor of Track. Instead of six divisions under charge of Supervisors there are now four. The change was made with the appointment of Mr. Hoyt.

New York, New Haven & Hartford.—G. W. Brady, heretofore Superintendent of the Norwich Line steamers, has been appointed Assistant Superintendent of the New York Division of the N. Y., N. H. & H., at Harlem River. This position was formerly occupied by W. E. Chamberlain, who is now General Manager of the road.

Northern Pacific.—W. M. Tuohy, who has been General Agent at Butte, Mont., has resigned. He will accept position as General Manager of the Street Railway Co., the Water Works Co. and the Electric Light Co. in Anaconda.

Omaha & St. Louis.—H. Visscher has been appointed Assistant Treasurer of the Omaha & St. Louis, the Omaha, Kansas City & Eastern and the Kansas City & Northern Connecting Railroads, vice A. L. Howe. Mr. Howe continues to be Assistant Treasurer of the Kansas City, Pittsburgh & Gulf.

Pittsburgh, Cincinnati, Chicago & St. Louis.—Edward E. Wright has been appointed Freight Claim Agent, with office at Pittsburgh, Pa. He holds the same office for the other Pennsylvania Lines West of Pittsburgh. (July 29, p. 555.)

Pittsburgh, Ft. Wayne & Chicago (Penn. Co.).—Henry C. Rippe has been appointed Private Secretary to C. D. Law, Superintendent. He succeeds J. T. Kulp, resigned.

Plant System.—W. C. Dennis, heretofore Secretary of the Southeastern Mississippi Valley Association at Louisville, has been appointed Assistant General Freight Agent, with headquarters at Savannah, Ga.

St. Louis & San Francisco.—H. M. Flickinger has been appointed Northwestern Passenger Agent, with headquarters at Kansas City.

St. Louis, Peoria & Northern.—George A. Hackett has been appointed Traveling Agent, with office in St. Louis, Mo.

Skaneateles.—The Directors of this road are: W. K. Niver, S. E. Bowman, H. C. DuVal, Henry Lacy, Edward S. Teff, J. E. Waller and F. C. Roosevelt. The officers are W. K. Niver, President; George Barrow, Secretary, and S. E. Bowman, Treasurer. The office is at Skaneateles, N. Y.

Southern.—H. F. Smith, General Freight Agent, has resigned.

T. C. Powell has been appointed General Freight Agent, to succeed H. F. Smith, who has accepted a position as Traffic Manager of the Nashville, Chat-

tanooga & St. Louis. Mr. Powell was formerly Assistant General Freight Agent on the Queen & Crescent Route, and later Chief Clerk to General Agent H. F. Smith.

Southern California (Santa Fe Route).—W. F. Perriss has been appointed Roadmaster, with headquarters at San Bernardino, Cal. He succeeds O. T. Cassin, resigned.

Spokane Falls & Northern (Great Northern).—Cornelius Shields has been appointed General Manager of this road.

Tellico.—The President of this road is T. E. H. Croskey, Madisonville, Tenn., and the General Manager is O. R. Brigham, Athens, Tenn. (See Railroad News Column.)

Tifton & Northeastern.—J. L. Joy, Jr., has been appointed to the position lately vacated by E. J. Williams, Jr., as Auditor and Cashier at Tifton, Ga.

Toledo & Ohio Central.—J. E. Gould, Assistant Master Mechanic at the Dennison shops of the Pennsylvania Lines West of Pittsburgh, has been appointed Master Mechanic of the Columbus shops of the T. & O. C. The appointment is effective Sept. 1.

Union.—G. K. Lawrence has been appointed Engineer Maintenance of Way. J. O. Willard, Supervisor, has retired, and W. A. Lauman has been appointed in his place. The offices are located in Pittsburgh, Pa.

Union Pacific.—Henry P. Flavin has been appointed Assistant Superintendent of the First and Second Districts of the main line, with office at Omaha, Neb.

John O'Hearn, Superintendent of the shops at Cheyenne, Wyo., has resigned. He intends to leave railroad service.

A. Q. Campbell has been appointed Roadmaster of the First and Second Districts of this road. He succeeds J. Murray, resigned. Mr. Campbell was formerly Roadmaster on the Kansas Division.

Union Pacific, Denver & Gulf.—The title of M. F. Egan has been changed from Master Mechanic to Superintendent of Motive Power.

United Verde & Pacific.—J. T. Whedon has been appointed Superintendent, with headquarters in Jerome, Ariz., vice John Burns, resigned.

Vicksburg, Shreveport & Pacific (Queen & Crescent Route).—H. B. Hearn, formerly Agent at Shreveport, La., has been appointed Commercial Agent, with headquarters at the same point.

Wabash.—J. B. Wells has been appointed Acting Inspector of Fuel and Locomotives of the Third, Fourth and Fifth Districts of the Wabash, with headquarters at Montpelier, O.

T. L. Cochrane has been appointed Traveling Freight Agent, with headquarters at St. Thomas, Ont. Mr. Cochrane was heretofore agent of the Grand Trunk at St. Thomas.

Western & Atlantic.—E. P. Burns has resigned as General Agent at Atlanta.

York Southern.—At the annual meeting of the stockholders held in York, Pa., Aug. 9, C. R. McConkey was elected Secretary, vice M. H. Housemann.

RAILROAD CONSTRUCTION, Incorporations, Surveys, Etc.

BRIDGTON & SACO RIVER.—The five-mile extension of this 2-ft. gage Maine railroad to the town of Harrison has been completed and is now in operation. An excursion train, to celebrate the opening of the road, was run on Aug. 3. (May 20, p. 366.)

CANTON, ABERDEEN & NASHVILLE.—Application has been made to the Secretary of State at Montgomery, Ala., for a charter for a road by this name with a capital of \$1,000,000. The principal parties interested are Stuyvesant Fish, President of the Illinois Central, and other officers of that road, and the proposed line is from West Point, Miss., on the Aberdeen Branch of the I. C., northeastward about 60 miles to Winfield, Marion Co., Ala., on the Kansas City, Memphis & Birmingham. At Winfield is a large tract of coal land belonging to the Mississippi Valley Coal Co., a concern in which the Illinois Central is interested. It is said that surveys have already been made and that contracts for some of the grading have already been let. The charter contemplates a future extension northeastward 65 miles further to Decatur, Ala., and possibly to Nashville, Tenn.

CENTRAL WASHINGTON.—A surveying party has recently begun work on a line from the western terminus of this road at Coulee City, Wash., northwestward to Chelan, at the southern end of Lake Chelan, about 40 miles. This road is now in operation from Cheney, near Spokane, westward 108 miles to Coulee City. The proposed extension lies through the Big Bend of the Columbia, a fertile region.

CHESAPEAKE BEACH.—This road, projected to run from Washington, D. C., east about 30 miles to Chesapeake Beach, Md., is now in operation between Deanwood and Marlboro, 12 miles. (June 24, p. 466.)

CHIHUAHUA & PACIFIC.—El Paso (Tex.) papers report that 1,000 men are now at work on the construction of this Mexican railroad, and that 2,000 more are needed.

CLEVELAND & NEW CASTLE.—Grading has been begun on the grading of this Ohio railroad, which it is proposed to build from Akron eastward 85 miles to New Castle, Pa. A force of men has been put on at Monroe Falls and ground will be broken at Ravenna within a few days. (Mar. 4, p. 169.)

COLUMBIA & WESTERN.—This road, controlled by the Canadian Pacific, is to be changed from narrow to standard gage between Trail and Rossland, B. C., about 10 miles. The contract for the work has been let to Winters, Parsons & Boomer. At the same time, two switchbacks will be abolished and a number of 25 degree curves will be taken out. It is said that the cost of the improvements will be about \$120,000.

DENVER & RIO GRANDE.—Work has been begun on the branch of six miles to Ibex near Leadville, Colo. The contractors are Orman & Crook, of Pueblo. (July 29, p. 555.)

DETROIT & LIMA NORTHERN.—The Columbus Northwestern, a new road to be operated by the D. & L. N., is now completed from St. Johns, O., southward through Bellefontaine to Peoria, Union County, O., the last spike having been driven at Bellefontaine last week by Mr. Marquis, President of the Columbus Northwestern. The length of the road from St. Johns to Peoria is about 37 miles. From the last named town connection is made with Columbus, 36 miles, by the Toledo & Ohio Central.

EVERETT & MONTE CRISTO.—The Post Intelligencer, of Seattle, Wash., reports that a new route has been surveyed for a line to take the place of that portion of this road which was destroyed by a flood a year ago, and that the new line will surely be built. The line as surveyed runs from the lower end of Stilliguamish Canyon to a point near Bogardus. It runs south of the canyon, and is entirely above danger from floods in the river. Rails are now being hauled from the old roadbed to points on the new line.

FAIRCHILD & NORTHEASTERN.—This road, now in operation from Fairchild, Wis., on the Chicago, St. Paul, Minneapolis & Omaha, northeastward to Greenwood, 23 miles, is being extended 3½ miles further. The contractor for the new work is G. W. Gorman; Mr. J. W. Godfrey is Chief Engineer of the road.

FLORIDA & ALABAMA.—The Birmingham (Ala.) Herald reports that the contract for the grading of this road has been let to R. M. Quigley & Co., of St. Louis, though it is stated that the connection with the Louisville & Nashville will be made at Georgiana instead of Garland, Ala., as stated in previous reports. (July 22, p. 538.)

FREMONT, ELKHORN & MISSOURI VALLEY.—This company is building a line around the city of Fremont 3½ miles long. This track is laid on the line of a former track which was taken up several years ago.

GALLATIN.—The final survey of this Montana railroad has been finished, and it was reported at Bozeman, Mont., last week that contracts for grading would be let at once. A number of prominent contractors have already looked over the line. The officers of the company hope to have the grading done within two or three months. W. W. D. Turner, of Bozeman, is President. (May 20, p. 367.)

GREAT NORTHERN (CAN.).—This company, which proposes to build a railroad from a connection with the Canada Atlantic northeastward to Quebec, has made a contract with the City of Quebec by which that city agrees to take \$200,000 stock of the road. Reports state that the contract was signed by the President of the road and the Mayor of the city last week. (June 10, p. 422.)

HALIBURTON, WHITNEY & MATTAWA.—Messrs. Gordon & Sampson, solicitors, Toronto, Ont., give notice that application will be made at the present session of the Ontario Legislature for an act to incorporate this company, with power to build a railroad from the terminus of the Grand Trunk at Haliburton, Ont., northward to a point on the Ottawa, Arnprior & Parry Sound, near Whitney, and then farther north to Mattawa, on the Canadian Pacific.

KEOKUK & WESTERN.—This proposed railroad from Cainsville, Mo., southwest, 30 miles, to Pattonsburg, has now been wholly surveyed, and Kansas City papers report that work on the grading will be begun at once. (June 17, p. 445.)

LEHIGH VALLEY.—A contract has been let to H. O. Duerr of South Bethlehem, Pa., for broken stone to be used in ballasting parts of the main line. The rock is to be quarried at Redington, Pa., and Flint Hill, near North LeRoy, N. Y.

MEXICAN ROADS.—The Mexican Government has modified the concession granted in 1895 for building a railroad from Saltillo to the Mexican International. The modification, which was issued July 7 last, requires the line to be built from Saltillo to Paredon on the Monterey & Gulf, or to a point between Paredon and the next station, Previno. Surveys must be begun within one year, and work within a year and a half.

The Diario Official, Mexico City, states that President Diaz on June 4 approved the concession to Pearson & Sons of England to build a railroad in the state of Vera Cruz, from Acayuacan or Paso de San Juan to Tuxtla and San Nicolas, with the privilege of extending to Alvarado. Work must be begun within eighteen months. The Government grants the usual exemption from taxes, and also gives large tracts of public lands. The Mexican representative of Pearson & Sons is Pedro M. Armendariza.

MUSCATINE, NORTH & SOUTH.—Work is now in progress on the line of this new railroad from Muscatine, Ia., southward 25 miles to a connection with the Iowa Central at Elrick, Ia. The contractor is E. L. Tennis of Thompsonontown, Pa., who, besides the grading which is now in progress, will build the track and the station buildings. He expects to have the whole of the work completed by Jan. 1. It is said that possibly the southern terminus may be at Newport, Ia., which is the next station west of Elrick on the Iowa Central. The company has in view an extension farther south to Burlington, 20 miles, at some future time. The President of the road is W. R. Stewart, Jr., 58 Board of Trade Building, Chicago.

NEW YORK & OTTAWA.—This road has now been finished from Cornwall, Ont., on the St. Lawrence River north 50 miles to Hawthorne Junction, and regular passenger trains began running between Cornwall and Ottawa on July 29. The track of the Canada Atlantic is used from Hawthorne Junction to Ottawa. The bridge over the St. Lawrence at Cornwall, connecting this portion of the line with that running south into New York, will not be finished for about two months. The approaches are completed and two spans of the superstructure are in position; the anchor for the south cantilever span in the north channel is finished, and the drawbridge across the canal is already in use. The company has just received two new passenger trains from the Pullman Co., each train consisting of two passenger cars and a baggage, mail and express car. For the present there will be one passenger train each way daily and one mixed train. The company has a number of passenger train cars besides the new trains. The locomotive equipment consists of three new 10-wheelers, built by the Baldwin Locomotive Works, and three other engines which have

been used in building the road. The station building at Cornwall is a frame building 18 ft. x 52 ft.

This railroad has been built by the New York & Ottawa Co., of which George W. Parker of St. Louis is President. The officers of the railroad company are given under "Elections and Appointments."

PENOBCOT CENTRAL.—The Augusta (Me.) Journal reports that work is in progress on this road near Charleston, the bridge at Brown's Mill being nearly completed. Track-laying is in progress at Kenduskeag. The line of the proposed road is from Bangor, Me., northeast about 25 miles to Charleston. (May 6, p. 332.)

PHILADELPHIA & READING.—Preparations are being made to build a short piece of track about 1.5 miles long at Shippensburg, Pa., to connect the Reading line with the Western Maryland. The new line will avoid the heavy grade in the present connecting track. Bids for the grading have already been asked for. It is reported that the two roads will greatly enlarge their freight yards at Shippensburg.

ST. LOUIS & OKLAHOMA CITY.—This road, which is being built westward from Sapulpa, I. T., the southwestern terminus, in Indian Territory, of the St. Louis & San Francisco, has been completed and opened for business as far as Stroud, O. T., 39.5 miles from Sapulpa. The line passes through Kellerville and Bristow. (Feb. 25, p. 149.)

UNION PACIFIC.—General Manager Dickinson, Chief Engineer Berry and other officers of this road have made a tour through the valley of the North Platte River, in the western part of Nebraska, to consider the propriety of building a railroad through the valley, connecting with the main line at North Platte.

VALLEY CONNECTING.—This new railroad in Western Pennsylvania, the chartering of which was noticed in this column last week, is already finished. It is only one mile long, connecting the Lake Shore & Michigan Southern with the lines of the Pennsylvania Co.

WISCONSIN & MICHIGAN.—It is reported that track will be laid on the extension of this road from its present northern terminus at Faithorn Junction, Mich., northwestward to Norway, the present season. The distance to Norway is about 12 miles, while the final terminus of the proposed extension is Iron Mountain, Mich., about eight miles further.

WYOMING & MISSOURI RIVER.—Work has been begun on the railroad of this company from Belle Fourche, S. D., up the Hay Creek Valley 18 miles. George M. Nix, Belle Fourche, S. D., is President. (May 27, p. 383.)

Electric Railroad Construction.

ALTON, ILL.—The Alton Railway & Illuminating Co. will build about 3 miles of new track in the spring of 1899, and will buy additional equipment and one power generator. No additions are likely to be made to the steam plant.

BALLSTON SPA, N. Y.—The Ballston Terminal Railroad Co. has completed its road to Middle Grove, about 14 miles. This company was chartered in March, 1896, for the purpose of moving loaded freight cars between the main line of the Delaware & Hudson Canal Co.'s railroad and the manufacturing establishments between Ballston Spa and Middle Grove.

BOSTON, MASS.—The city of Malden has given permission to the Boston Elevated Ry. Co. to lay double tracks on Broadway and Eastern avenue. This franchise will give a new route from Malden to Boston.

CANONSBURG, PA.—The Canonsburg Street Rail-way Co. has been chartered, with a capital stock of \$47,000, to build a line 4½ miles long, from Canonsburg to the Chartiers Valley RR, at Meadow Lane. The incorporators are: Arthur Kennedy, President, Allegheny, Pa.; Harry A. Jones, John A. Wilson, A. C. Munhall and James Kent, Washington, Pa.

CHARLESTON, S. C.—The Charleston & Seashore Railroad Co. has completed its road. Passengers are taken across Charleston Harbor to Mt. Pleasant by ferry, from there the electric cars run to Long Island, about five miles. (Mar. 18, p. 209.)

CLINTON, N. Y.—It is stated that I. J. Griffith of Utica, N. Y., is interested in the proposed Sanquiot Valley Electric RR., and that he will shortly call for bids for the construction and equipment of the road. (Aug. 5, p. 571.)

ELIZABETH, N. J.—At a meeting of the Union County Board of Freeholders, held Aug. 4 to consider bids for the franchise to build a trolley road over Westfield avenue from Elizabeth to Plainfield, one bid was received from John Kean, representing the Elizabeth St. Ry. That company bid \$250,000 for a term of 75 years, the amount to be paid in installments as the work of widening the avenue from 60 ft. to 100 ft. progressed. The company offers to pay a license of \$100 a year. The proposed fares are, from Elizabeth to Plainfield and return, 25 cents, or 15 cents single ticket. Between the townships of Cranford and Westfield, 5 cents. Points west of Westfield, 5 cents; points between Elizabeth and Westfield, 8 cents. Thirty-three school tickets, \$1. (Feb. 11, June 17, p. 111, 445.)

FLAGSTAFF, ARIZ.—Press reports state that Mayor Aubineau, of Flagstaff, and Joseph D. Schuyler, of Los Angeles, Cal., are interested in a project to build an electric railroad from Oak Creek to the Grand Canyon.

HARVARD, ILL.—Franchises for 50 years have been granted for an electric railroad to be built along the public highway from Harvard, Ill., to the head of Geneva Lake, Wis. The company proposes to carry freight and will build a road suitable for heavy cars. It is estimated that the creamery products alone immediately on the line aggregate 2,000,000 lbs. of package freight annually. H. H. Windsor, Old Colony Building, Chicago, is one of the promoters.

HOKENDAUQUA, PA.—The Hokendauqua & Egypt St. Ry. Co. has been chartered, with a capital stock of \$20,000, to build a line 3 miles long, connecting the villages named. The incorporators are: John W. Eckert, President; John L. Schwartz, Walter J. Sager, Edwin R. Snyder and P. F. Cannon, Allentown, Pa.

IOLA, KAN.—A franchise has been given the Iola Rapid Transit Co., recently incorporated, to

build an electric railroad from Iola to La Harpe, 7 miles. A. M. Beck, Secretary. (June 17, p. 445.)

MARION, IND.—The Marion City Ry. Co. has completed its interurban line from Fairmount to Summitville. This, with the line of the Union Traction Co., of Anderson, gives a continuous electric road between Anderson and Marion, about 35 miles.

MILWAUKEE, WIS.—The Milwaukee Electric Railway & Light Co. has let contracts for an addition to its power-house on River street, to cost \$600,000, and be completed on Dec. 31. The building will cover a lot 130x100 ft., between the Milwaukee River, Oneida and River streets, and will be two stories high. The company has recently opened a new trolley line to Whitefish Bay by way of Oakland avenue, and has abandoned the old dummy line.

MOUNT VERNON, N. Y.—The Westchester Electric Railroad Co. has filed a certificate of its intention to extend its road in the city of Mount Vernon.

NELSON, B. C.—Is stated that an electric railroad will be built in Nelson by C. S. Drummond, who represents the British Electric Traction Co., of London, England.

PEEKSKILL, N. Y.—The State Railroad Commission has granted an application of the Peekskill Traction Co. for permission to build an electric railroad in Peekskill, and from the village to the state camp, and thence to Verplanck's Point.

PETERSBURG, VA.—The City Council has given a franchise to the Piedmont Traction Co. of Charlottesville, Va., to build an electric railroad in Petersburg. The work must begin within six months, and the officers of the traction company say it will begin in much less time than that.

PHILADELPHIA, PA.—The Southwestern St. Ry. Co. has commenced laying tracks. The route will be from Otsego and Mifflin streets to Jackson street, to Fifth street, to Moyamensing avenue, to Penrose Ferry road, to Schuylkill bridge, across the bridge to State Island road, to Bow Creek, the County Line. Edgar A. Tennis is President of the company. (Jan. 14, July 15, pp. 35, 523.)

PORTLAND, ME.—The Portland RR. Co. has completed an extension of about 3 miles.

The Portland & Yarmouth Electric Ry. Co., which has been building since April, 1897, has commenced running cars through Portland, Deering, Falmouth and to the west line of the town of Yarmouth, in all about 10 miles.

PORTSMOUTH, N. H.—The contract for the engines for the power house of the new Portsmouth & Dover St. R. R. Co. has been awarded to the E. P. Allis Co. The power house is to be of brick, 60 x 118, and will be located at Noble's Island, near Portsmouth. A wooden car barn, 60 ft. x 160 ft., is to be erected near the Portsmouth Station of the Boston & Maine. The engines are to be of 200 H. P. and 300 H. P., respectively, high speed, simple, non-condensing. Messrs. Hodges & Harrington, 60 State street, Boston, are the consulting engineers for the company, and the work is in charge of Superintendent of Motive Power H. Bartlett and Chief Engineer G. M. Thompson, of the Boston & Maine. (Apr. 8, Aug. 5, pp. 267, 571.)

VERNON, MICH.—The Caledonia, Venice & Vernon Electric Railroad is being organized, it is reported, to build an electric road, about 18 miles long, running south, from the terminal at Corunna, of the Owosso & Corunna Electric Co. E. M. Hopkins, of Chicago, is reported interested.

VICTORIA, B. C.—The Mountain Tramway & Electric Co. was recently incorporated in Victoria. (Jan. 14, March 18; pp. 35, 209.)

WILLIAMSBURG, MASS.—Messrs. E. C. and E. E. Davis, of Northampton, have made preliminary surveys and estimates for the Western Hampshire St. Ry. Co.'s proposed trolley road, between Williamsburg and Cummington. The road will be from 12 to 14 miles long and will cost from \$147,726 to \$187,755, depending upon whether the route through Goshen, or that through Chesterfield, is selected. The road is not likely to be built this year.

GENERAL RAILROAD NEWS.

Railroad Earnings.

Showing the gross and net earnings for the periods ending at the dates named:

	June 30.	1898.	1897.	Inc. or Dec.
Central of Georgia.				
1 month..... Gross	\$356,255	\$331,757	L. \$24,498	
1 " " Net	86,673	70,899	L. 9,774	
12 months..... Gross	5,507,069	5,280,695	L. 226,373	
12 " " Net	1,850,629	1,828,133	L. 22,495	
Chicago, Burlington & Quincy.				
1 month..... Gross	\$3,192,949	\$3,022,133	L. \$170,816	
1 " " Net	9,450	75,158	D. 65,708	
12 months..... Gross	42,800,162	35,526,186	L. 7,273,976	
12 " " Net	5,847,944	3,807,847	L. 2,040,097	
Chicago, Rock Island & Pacific.				
1 month..... Gross	\$1,866,872	\$1,782,541	L. \$84,331	
1 " " Net	636,413	720,090	D. 83,677	
3 months..... Gross	4,803,130	3,906,064	L. 897,066	
3 " " Net	1,385,022	1,024,299	L. 360,723	
Delaware, Lackawanna & Western.				
3 months..... Gross	\$1,866,872	\$1,782,541	L. \$84,331	
3 " " Net	636,413	720,090	D. 83,677	
6 months..... Gross	3,448,230	3,185,401	L. 362,829	
6 " " Net	1,180,366	1,238,134	D. 57,768	
Long Island.				
1 month..... Gross	\$481,799	\$472,635	L. \$9,164	
1 " " Net	208,639	197,557	L. 11,082	
12 months..... Gross	4,683,956	4,329,571	L. 354,385	
12 " " Net	1,449,594	1,297,980	L. 151,614	
Mexican National.*				
1 month..... Gross	\$505,177	\$479,649	L. \$25,528	
1 " " Net	94,663	97,851	D. 3,188	
12 months..... Gross	3,035,098	2,999,024	L. 36,074	
12 " " Net	553,837	765,521	D. 211,684	
*Mexican currency.				
Mobile & Ohio.				
1 month..... Gross	\$308,004	\$301,567	L. \$6,437	
1 " " Net	58,110	86,063	D. 28,953	
6 months..... Gross	2,071,944	1,877,329	L. 194,615	
6 " " Net	481,971	519,785	D. 37,814	
Norfolk & Western.				
1 month..... Gross	\$24,772	\$24,301	D. \$17,529	
1 " " Net	203,071	201,943	L. 1,128	
12 months..... Gross	11,236,123	10,537,723	L. 698,400	
12 " " Net	3,350,024	2,634,272	L. 715,752	

June 30.	1898.	1897.	Inc. or Dec.
Oregon Railroad & Navigation Co.			
1 month.....	Gross \$549,807	\$417,222	I. 132,585
" " "	Net 224,581	164,330	I. 70,251
12 months.....	Gross 6,895,393	4,691,978	I. 2,203,415
" " "	Net 2,941,973	1,898,877	I. 1,043,096
Oregon Short Line.			
1 month.....	Gross \$601,304	\$586,479	I. \$14,825
" " "	Net 319,896	313,509	I. 6,387
12 months.....	Gross 6,317,068	5,726,247	I. 590,811
" " "	Net 2,728,598	2,246,868	I. 481,730
Philadelphia & Erie.			
1 month.....	Gross \$368,218	\$373,555	D. \$5,337
" " "	Net 85,436	94,384	D. 8,948
6 months.....	Net 443,297	477,496	D. 34,199
Philadelphia, Wilmington & Baltimore.			
1 month.....	Gross \$900,817	\$756,517	I. \$144,300
" " "	Net 271,735	162,135	I. 109,600
8 months.....	Gross 6,166,034	5,650,054	I. 516,000
" " "	Net 1,580,760	1,390,760	I. 190,000
Rio Grande Western.			
1 month.....	Gross \$305,112	\$255,528	I. \$49,584
" " "	Net 117,238	114,692	I. 2,546
12 months.....	Gross 3,362,283	2,468,701	I. 893,582
" " "	Net 1,292,612	863,962	I. 428,650
Union Pacific.			
1 month.....	Gross \$1,385,445	\$1,260,931	I. \$124,514
" " "	Net 622,736	582,201	I. 240,535
6 months.....	Gross 7,610,579	6,736,832	I. 933,747
" " "	Net 3,136,161	1,979,099	I. 1,157,062
Union Pacific, Denver & Gulf.			
1 month.....	Gross \$282,888	\$270,594	I. \$12,594
" " "	Net 57,883	31,969	I. 25,914
12 months.....	Gross 1,816,625	1,584,201	I. 232,423
" " "	Net 564,012	403,379	I. 160,632
Wabash.			
1 month.....	Gross \$1,081,160	\$948,940	I. \$132,220
" " "	Net 267,788	297,160	I. 29,372
12 months.....	Gross 13,207,862	11,526,787	I. 1,681,075
" " "	Net 3,903,083	3,547,628	I. 355,455
Western New York & Pennsylvania.			
1 month.....	Gross \$250,180	\$228,272	I. \$21,908
" " "	Net 81,249	51,787	I. 29,462
3 months.....	Gross 732,204	669,440	I. 62,764
" " "	Net 189,289	168,102	I. 21,577
July 31.			
Great Northern (entire system).*			
1 month.....	Gross \$1,789,011	\$1,778,820	I. \$10,191
*Estimated.			
Mobile & Ohio (estimated).			
1 month.....	Gross \$339,700	\$299,143	I. \$40,557
6 months.....	Gross 2,414,019	2,177,471	I. 236,548
New York Central & Hudson River.			
1 month.....	Gross \$3,298,217	\$3,632,249	D. \$334,032
12 months.....	Gross 49,772,965	47,912,387	I. 1,860,578
Northern Pacific.			
1 month.....	Gross \$1,887,536	\$1,840,361	I. \$47,175
Texas & Pacific (estimated).			
1 month.....	Gross \$471,847	\$466,528	I. \$5,309
7 months.....	Gross 3,993,128	3,517,013	I. 476,115

ATLANTIC COAST LINE OF SOUTH CAROLINA.—President C. S. Gadsden announces, effective Aug. 1, that the Atlantic Coast Line Railroad Company of South Carolina will become the actual and legal successor by consolidation of the following five railroad companies: the Wilmington, Columbia & Augusta; the North Eastern of South Carolina; the Cheraw & Darlington; the Manchester & Augusta, and the Florence of South Carolina. The principal office of the new company will be at Charleston, S. C. The officers of the new company are given under Elections and Appointments. The aggregate length of the roads of the consolidated company is 675 miles.

BALTIMORE & OHIO.—Messrs. Speyer & Co. and Kuhn, Loeb & Co., the reorganization managers, announce that the plan for the reorganization of the company's property is operative. Over 93½ per cent. of the bonds and over 73 per cent. of the stocks of the different companies included in the system have been deposited under the agreement of June 22. The time for further deposits of bonds and stocks without additional charge has been extended to Aug. 20, after which date deposits will be accepted only upon a cash payment of 2 per cent. of the par value of bonds and an additional cash payment of \$2 a share of stock deposited. Unpaid coupons and claims for interest on registered bonds matured prior to July 1 last must be deposited on or before Aug. 20.

BURLINGAME & NORTHWESTERN.—This company, successor of the Manhattan, Alma & Burlingame, has been organized in Kansas and its charter was filed at Topeka, July 29. The property was sold at auction April 19 to A. Sherwood, of St. Louis, for \$200,000. The capital stock of the new company is \$340,000. The road extends from Burlingame, Kan., northwest through Alma to Manhattan, 57 miles. It is operated by the Atchison, Topeka & Santa Fe. On Aug. 1 that part of the road between Alma and Manhattan, 23 miles, was abandoned, and trains began running between these points over the Chicago, Rock Island & Pacific, a lease for this purpose having gone into effect on that day. (Apr. 29, p. 318.)

DENVER, LEADVILLE & GUNNISON.—The United States Court at Denver, Aug. 6, ordered this road to be sold at auction under foreclosure proceedings on Aug. 16. The suit is brought by the American Loan & Trust Co. This road is now operated in connection with the Union Pacific, Denver & Gulf, Frank Trumbull being receiver of both. Denver papers think that the Union Pacific will be the purchaser.

KINGFIELD & DEAD RIVER.—This 10-mile Maine railroad was sold at auction by the Sheriff at Kingfield, Aug. 2. The purchaser was J. S. Maxcy, of Gardiner. The road is a 2 ft. gage line operated by the Franklin & Megantic.

NEW YORK CENTRAL & HUDSON RIVER.—After July 1 the monthly reports of earnings will show earnings from operations only, instead of earnings from all sources, as published heretofore. Income from investments and from miscellaneous sources will be reported in quarterly statements as an addition to net earnings from operation.

SKANEATELES.—The Syracuse Standard reports that Mr. W. K. Niver, of that city, has bought from John E. Waller the controlling interest in this road. The road is five miles long, connecting the town of Skaneateles, N. Y., with the Auburn Division of the New York Central. It was built in 1866. It is said that the new owner will make arrangements for running passenger trains through between Skaneateles and Syracuse, 23 miles, over the New York Central. Mr. Niver had applied for a franchise to build an electric railroad between Syracuse and Skaneateles, but it is said that now the electric project will be dropped.

TELlico.—This is the name of the new company which has taken possession of the Nashville, Tellico & Charleston, which extends from Athens, Tenn., to Tellico Plains, 23 miles. The sale under foreclosure was confirmed by the Court July 22. The purchase price was \$10,000. The President is T. E. H. McCroskey, Madisonville, Tenn. (Apr. 22, p. 301.)

TUSKEGEE.—This Alabama railroad, 5 miles long, from the Western of Alabama at Chehaw to Tuskegee, has been leased to the Atlanta & West Point, which is affiliated with the Western of Alabama. On Aug. 1 the gage of the Tuskegee was changed from 3 ft. to standard.

WHEELING & LAKE ERIE.—At Cleveland, O., a foreclosure suit was brought against this company, Aug. 8, by the Mercantile Trust Co. of New York, trustee of the first mortgage bonds on the Lake Erie Division. The road is now in the hands of receivers under other foreclosure suits. (July 22, p. 540.)

Electric Railroad News.

BROOKLYN, N. Y.—The reports of the Brooklyn Heights RR. Co. (including the Brooklyn, Queens County & Suburban RR. and the Sea Beach Ry.), for the month of July, show earnings as follows:

	1898.	1897.	Inc.
Passenger earnings	\$560,520	\$471,840	
Other income	11,596	17,623	
Total	\$572,116	\$489,463	

CHICAGO, ILL.—The reports of earnings of the North Chicago St. Ry. Co. for periods ending July 31 are as follows:

	1898.	1897.	Inc.
1 month	\$263,003	\$258,483	\$4,520
7 months	1,670,946	1,584,638	86,308
Total	\$2,336,367	2,177,217	I. 59,649

The earnings of the West Chicago St. Ry. for periods ending July 31 are reported as follows:

	1898.	1897.	In. or Dc.
1 month	\$349,325	\$347,142	D. \$2,183
7 months	2,236,367	2,177,217	I. 59,649

NEW YORK, N. Y.—At a meeting of the stockholders of the Metropolitan St. Ry. Co., held Aug. 9, it was voted to increase the capital stock from \$30,000,000 to \$45,000,000. (June 24, July 22, pp. 468, 540.)

QUINCY, ILL.—Press reports state that the street railroads of Quincy were sold Aug. 5 to W. B. McKinley, of Chicago, representing a Maine syndicate. Mr. McKinley is General Manager of the Joliet Ry.; President of the Bay City Consolidated Ry., and President of the Springfield (O.) Ry.

SAGINAW, MICH.—Local papers state that the Inter-Urban Ry. is sold to the Boston Safe Deposit and Trust Co. This road commenced operations in August, 1896.

TERRE HAUTE, IND.—The Chicago bondholders of the Terre Haute Street Ry. Co. met at the Illinois Trust & Savings Bank recently and a committee was appointed to represent the interests of the bondholders and co-operate with the Illinois Trust & Savings Bank, trustee of the railroad, with a view of enforcing payment. Those appointed on the committee were: W. H. Hinkle, Secretary of the Illinois Trust & Savings Bank, Chairman; Demas Deming, Terre Haute, and M. L. Scudder, New York.

TRAFFIC.

Traffic Notes.

Pittsburg enjoyed a "coal-boat rise" in the river last week, and on Aug. 6 and 7 nearly 8,000,000 bushels of coal were floated down.

The New Orleans Picayune reports that large numbers of Italians are coming to that city, with the intention of seeking their fortunes in Cuba.

The United States Grand Jury at St. Paul has returned indictments against W. C. Baldwin and George W. Elliott for misrepresenting the weight of potatoes shipped by railroad.

The Union Pacific has notified live stock shippers that cattle billed through from Utah to eastern markets may be stopped off at Denver for the purpose of trying the market at that point.

The Mallory Steamship Line has reopened its freight office in Boston, which was closed at the beginning of the war with Spain on account of the sale of the company's vessels to the Government.

In response to an inquiry from the Quartermaster's Department of the Army at New York City, some or all of the Trunk Lines have granted a reduction of 50 per cent. in passenger fares for wounded soldiers who may desire to visit their homes.

The agreement for a restoration of grain rates from Minneapolis to New York to a basis of 25½ cents, to take effect Aug. 15, is said to be a failure, owing to sixty-day contracts at lower rates having been made by some of the all-rail lines since the meeting.

Officials of the Trans-Mississippi Exposition have applied to the Western Passenger Association for a much greater reduction than that now in force for excursion rates to Omaha, and a meeting of the Association is called for this week to consider the request. Owing to the failure of the municipal authorities at Omaha to enforce the ordinances against ticket brokers, as was promised would be done, many of the lines are not in favor of acceding to the request until the Exposition authorities bring this about.

The Southern Pacific has issued a circular prescribing storage and demurrage rates at freight stations on the Pacific system and on the Oregon lines. On goods in freight houses the free time is three days after service of notice; the rate for the next 30

days thereafter is five cents per 100 lbs., and the same for each subsequent 30 days or fraction; minimum, 25 cents for each 30 days or fraction. Demurrage on carload freight at the usual rate, \$1 a day, begins 48 hours after the morning of the next day after service of notice.

The Railroad Commissioners of Texas have notified each express company doing business in the state that the Commission will require the carrier to furnish the revenue stamp for bills of lading. Under the laws of Texas common carriers must receive packages, must issue a bill of lading and must not charge rates higher than those prescribed by the State Railroad Commission, on penalty of fine for the crime of extortion. By these three clauses the Commission thus assumes a jurisdiction which, it appears, is dependent upon to enforce the federal revenue law, in accordance with the views of the Commissioners.

While in Chicago last week, the Interstate Commerce Commission finished taking testimony in the case of the grain shippers against the Illinois Central, the Chicago, Milwaukee & St. Paul and other Northwestern lines. The shippers ask the Commission to order a reduction of 20 per cent. in the rates from Northwestern Iowa points, claiming undue discrimination. This complaint is of the same nature as is periodically made by the shippers from one or another point in the Northwest. The roads have always claimed that grain rates were adjusted on the most equitable basis they have been able to devise, and that a change in any one direction would only result in complaints from other quarters, and would seriously deplete their revenues without benefiting anyone.

The Canadian Pacific Controversy.

The Interstate Commerce Commission commenced taking testimony at Chicago, Aug. 1, in the hearing on the application of the Western lines for relief from the passenger competition of the Canadian Pacific to the Pacific Coast. All the members of the Commission were in attendance. The argument for the Western lines was, by agreement, made by P. S. Eustis, General Passenger Agent of the Burlington. The Canadian Pacific was represented by D. McNicoll, Passenger Traffic Manager, and his attorney, Mr. Raymond. The latter stated, as preliminary to the hearing, that the Canadian Pacific disclaimed being present in the position of an accused party, or to answer to any formal complaints filed against it. This point was conceded by the Commission.

Mr. Eustis, in opening, reviewed the history of the transcontinental passenger situation from June 28, 1886, when the Canadian Pacific commenced operations, up to the present time. No differential had been accorded the Canadian Pacific until March 1, 1888, and it had no representation in the Trunk Line rate sheets until Sept. 1, 1896. On Nov. 18, 1886, the Manitoba Pacific made a reduction of \$10 in the transcontinental rate via the Canadian Pacific, and from that time until the differential was allowed the Canadian Pacific had been a constant disturber of rates. The American roads do not seek to exclude the Canadian Pacific from participation in American traffic, he said, but only desire that it shall compete on an equality with them. He concluded his argument by asking the Commission to decide that the Canadian Pacific had no right to a differential on transcontinental business.

Mr. F. I. Whitney, General Passenger Agent of the Great Northern, testified as to the relations of the Manitoba Pacific and the Canadian Pacific before the completion of the Great Northern as a transcontinental line. Prior to that time the Canadian Pacific controlled the transcontinental business over the two roads. It had four-fifths of the entire haul and dictated the policy of the line.

Mr. T. H. Goodman, General Passenger Agent of the Southern Pacific, and Mr. C. S. Fee, General Passenger Agent of the Northern Pacific, testified that differentials were granted the Canadian Pacific, not in recognition of any right, but solely to keep it from demoralizing rates; in other words, it was a tribute the American roads were forced to pay.

Mr. McNicoll, in answer to questions of the Commissioners, claimed that the only reason for the demand of the Canadian Pacific for a differential was that its running time between Boston and Portland, Or., was 29 hours longer than that of its competitors, and that it could not furnish passengers as good facilities as the American lines; on some of the business it did not claim to be entitled to a differential. He said that the Canadian Pacific had never taken the initiative in reducing rates, but that whenever it detected its American competitors secretly cutting rates it proceeded to meet the reductions with open rates. The American lines had been the violators of the law, not the Canadian Pacific. He said that his line had been and was ready to arbitrate and to restore rates whenever the American lines would do the same. Regarding the Klondike business, which precipitated the recent reductions, he claimed that his line carried only about 6 per cent. of the entire New York business, in all only 338 passengers, during the year ending Oct. 31, 1897. The C. P. was willing to concede the Great Northern and Northern Pacific a differential rate of \$30 or \$40 on through traffic from Hong Kong to Montreal, but these roads demanded \$60. The Canadian Pacific has 700 miles of road in Vermont and Maine, on which it pays taxes in the United States. In 1897 the American traffic of the Canadian Pacific did not exceed \$1,300,000, with net earnings of about \$300,000. Against this the road spent \$3,500,000 a year for supplies purchased in the United States. The American business contributed only 6 per cent. of the gross earnings of the road last year. He would exchange all his American business for the Canadian business secured by the American lines.

Vice-President Clough of the Great Northern was the next witness. He claimed that the Canadian Pacific had caused losses to the American roads of from \$20,000,000 to \$25,000,000 every year. He believed that while the United States and Canada remained two separate countries there could never be any fair competition between the carriers. He advocated a recommendation by the Commission to Congress for an amendment of the laws which would better protect the American roads. Mr. Raymond closed for the Canadian Pacific, saying in substance that the Canadian Pacific was not a violator of the Interstate Commerce law, and only wanted what was right. The hearing was concluded Aug. 4, and the Commissioners requested the various parties to submit briefs covering their statements.

The causes of the existing demoralization, occasioning the Commission's inquiry, were related in the Railroad Gazette of March 4, last, page 172.